Computational Thinking

Class 5

Teacher Handbook

CENTRAL BOARD OF SECONDARY EDUCATION

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PREFACE

The National Education Policy (NEP) aims to position India as a leader in emerging knowledge fields by integrating technologies like AI, Machine Learning, Big Data, and Computational Thinking into school education. It promotes technology-enabled, interactive and gamified learning using tools such as Augmented Reality (AR), Virtual Reality (VR), and virtual labs to foster creativity, problem-solving and interdisciplinary exploration. NCF-SE 23 carries this recommendation further implementation.

While Artificial Intelligence (AI) is an important requirement, Computational Thinking (CT) should be a broader skill, developing a foundation for learning AI. It can cover various aspects like Cybersecurity, basic network, etc. Hence, CBSE approaches this by integrating Computational Thinking with AI and other technological advancements, without dependence on any platform.

The book challenges learners with problems involving multi-step deduction, hidden information, condition-based reasoning and transformations of numbers, shapes and arrangements. Students engage with tasks that require interpreting constraints, breaking complex situations into manageable parts and applying sequential logic to arrive at justified solutions. The document also provides pedagogy, learning resources, assessment support and classroom implementation guidelines to support structured, competency-based learning in alignment with NEP 2020.

Team CBSE

ACKNOWLEDGEMENTS

Expert Committee

1. Dr. Karthik Raman, Core Leadership, IIT Madras Bodhan AI Foundation; Professor, Department of Data Science and AI, Wadhwani School of Data Science and AI, IIT Madras
2. Dr. Rajesh Kumar, Professor, Department of Electrical Engineering, MNIT, Jaipur
3. Dr. Seema Verma, Professor (ECE), Additional Project Director (Siemens CoE), NITTTR, Bhopal
4. Dr. S. Neethi, Core Leadership, IIT Madras Bodhan AI Foundation; Professor of Practice, Department of Data Science and AI, Wadhwani School of Data Science and AI, IIT Madras
5. Dr. Arun L. Naik, Associate Professor, Mathematics Education, Azim Premji University, Bengaluru
6. Dr. Aanchal Chomal, Associate Professor, School of Continuing Education and University Resource Centre, Azim Premji University
7. Dr. Ankit Vijayvargiya, Assistant Professor, School of Technology, Dhirubhai Ambani University, Gandhinagar
8. Sh. R P Singh, Associate Prof &Additional Director, CBSE
9. Mr. Mikin Lala, (IIT Roorkee and IIM Calcutta Alumnus), Field Expert
10. Ms. Rekha Malhotra, (Alumna of British Institute (Business Management and Advertising), Frameworks Mumbai (Master's in Computer Science), and Workstation (3D Animation)), Field Expert

Material Production Group

1. Mr. Jay Thakkar, Senior Technical Officer, Centre for Creative Learning, IIT Gandhinagar
2. Mr. Chris John, Project Scientist, Centre for Creative Learning, IIT Gandhinagar
3. Mr. Mikin Lala, (IIT Roorkee and IIM Calcutta Alumnus), Field Expert
4. Ms. Amatullah Mustafa Neemuchwala, Field Expert
5. Ms. Telidevara Sree Lasya, Field Expert
6. Mr. Parth Oza, Field Expert
7. Mr. Deep Mayekar, Field Expert
8. Mr. Mayank Patil, Field Expert
9. Mr. Shivraj Ugale, Field Expert
10. Mr. Raj Dhorade, Field Expert
11. Mr. Nilesh Vijay Rajput, Field Expert

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Introduction

Computational Thinking (CT) is a problem-solving approach that comprises Decomposition, Pattern Recognition, Abstraction, Algorithm Design, Data Analysis and Troubleshooting. Computational Thinking Skills involve solving complex problems that promote thinking skills such as critical & creative thinking, abstraction and pattern recognition, as well as algorithmic thinking. Problem identification and problem solving necessitate the application of multidisciplinary understanding for creating effective solutions.

Artificial intelligence (AI) is a cutting-edge technology that empowers machines and computers to perform tasks that usually require mimicking human intelligence. These machines can perform complex thinking processes such as data analysis, pattern recognition, prediction of trends, solving problems and decision making. Thus, AI involves simulating cognitive processes associated with human intelligence and is widely applicable in various sectors such as banking, healthcare, defence, education, entertainment, agriculture and others for processing information, solving intricate problems and for planning.

The National Education Policy (NEP) aims for India to emerge as a global leader in new emerging knowledge domains such as artificial intelligence, machine learning, data analytics, 3-D machining etc. To realise this goal, the policy suggests teaching students Mathematics and Computational Thinking, along with new subjects like Artificial Intelligence, Machine Learning, and Data Science during their school education. The policy also focuses on technology-enabled learning and classrooms by using tools like artificial intelligence, machine learning, and adaptive testing to create knowledge.

The National Curriculum for School Education draws from this policy aspiration and emphasizes the need to introduce these emerging domains of study and technologies in the school curriculum. It recommends inclusion of subjects such as design thinking, augmented reality, virtual reality, artificial intelligence, and computational thinking. Additionally, it promotes the use of gamified content, interactive content, and immersive experiences (such as AR, VR, or virtual labs) to enhance student learning. In a variety of subjects, including design, music, art, and sciences, these resources support students in knowledge creation and exploration, and the development of capacities such as problem-solving, critical and creative thinking.

CBSE, under the aegis of the Department of School Education and Literacy, Ministry of Education, Govt. of India, is implementing a Curriculum on Computational Thinking and Artificial Intelligence (CT & AI) to inculcate AI-readiness in school students. This curriculum will be implemented from classes 3rd to 8th, in the session 2026-27, and aims to develop AI-Ready learners, by focusing on Computational Thinking Skills. The AI-readiness, so inculcated through CT Skills, will help develop the capacities of learners to use computational thinking, such as logical thinking, problem solving, pattern recognition, and so on, and understand the role and use of Artificial Intelligence in daily life. The Curriculum aims to build strong foundations in computational thinking, digital literacy, and responsible use of technology, along with nurturing innovation, critical thinking, and ethical decision-making capacities.

1. Relevance: Importance of introducing Computational Thinking (CT) and Artificial Intelligence (AI)

Introducing CT and AI in Grade 5 is critical for building a foundation for the technology-enabled society envisioned by national policies.

- **Foundation for AI:** CT is the intellectual backbone and cognitive framework required to understand how intelligent systems operate. Skills like breaking problems into parts and spotting patterns are the same reasoning processes that power AI and Machine Learning.
- **AI-Readiness:** The curriculum aims to develop AI-ready learners by building capacities in logical thinking and problem-solving, helping them understand the role of AI in daily life.
- **Holistic Development:** Beyond technical skills, CT contributes to creative problem-solving, critical thinking and ethical decision-making, which are essential for individual flourishing and responsible digital citizenship.
- **Interdisciplinary Connection:** It helps students see that knowledge is not compartmentalised by connecting disciplines like Mathematics, Science, and Humanities

2. Objectives (Curricular Goals)

For Grade 5 (the final year of the Preparatory Stage), the curriculum targets three primary goals:

- **CG-1:** Develop basic problem-solving skills with procedural fluency to solve daily-life problems as a step toward formal computational thinking.
- **CG-2:** Develop basic capacities of analytical thinking, verbal, and visual reasoning.
- **CG-3:** Demonstrate understanding of basic concepts of computers and knowledge of hardware and software.

3. Learning Outcomes:

ABSTRACT THINKING -

Students will be able to solve complex problems with multi-layered hidden cues, using:

- Different viewpoints of 3D objects.
- Changes in shapes after flips, turns, cuts/folds, or rotations, and changes in order and directions (clockwise or counterclockwise).
- Hidden or missing parts in incomplete shapes or patterns.
- Mirror/Water images and identical halves based on symmetry.

PATTERN RECOGNITION -

Students will be able to identify progressive patterns involving multiple changes in consecutive terms, formed using:

- Numbers
- Shapes or images
- Letters
- Or a mix of the above

DECOMPOSITION -

Students will be able to break down higher-order problems involving interconnected clues, using information from:

- Number clues (place values, sum/difference/product)
- 3D objects and their parts (faces, edges, corners)

- Step-by-step exchanges or transfers (money, objects, digits, quantities)
- Tables or charts with multiple pieces of information
- Conditions for counting/grouping/sorting items
- Pictures or visuals that represent certain numerical values

ALGORITHMIC THINKING

Students will be able to follow multi-layered rules to solve advanced problems involving:

- Number sequences formed using simple operations
- Movements on grids or direction-based paths
- Values that increase or decrease across steps
- Multi-step instructions involving moves, changes, transfers, swaps
- People/Events arranged in an order using attributes or chronological clues
- Simple counting instructions

4. Mapped with NEP and NCF 2023:

The curriculum is built upon the vision of the National Education Policy (NEP) 2020 and is directly aligned with the National Curriculum Framework for School Education (NCF-SE) 2023.

- **NEP 2020 Vision:** It fulfils the goal of making India a global leader in emerging domains like AI and machine learning by integrating them into school education.
- **NCF-SE 2023 Alignment:** The learning standards (Goals, Competencies, Outcomes) are derived from the framework suggested in the National Curriculum Framework for School Education 2023
- **Global Leadership:** It fulfills the NEP goal of positioning India as a global leader in emerging domains like AI and Machine Learning by integrating these topics early in school education.

5. Time Allocation

- **Annual Hours:** A total of 50 hours annually is suggested for the Preparatory Stage (Classes 3–5)
- **Integrated Model:** To ensure balance without overburdening students, this time it is not added as an extra subject but is integrated into Mathematics and "The World Around Us" (TWAU) periods.

6. Approach / Pedagogy

The pedagogical approach for Grade 5 is designed to be experiential and activity-based:

- **Hands-on Learning:** Use of games, puzzles and interactive worksheets to teach systematic problem-solving.
- **Collaborative Tasks:** Learning involves peer discussions and group work, allowing students to solve problems collectively using structured resources.
- **Systematic Decomposition:** Teachers guide students to break larger, complex problems into smaller, manageable parts.

7. Assessment:

Assessment at this stage shifts from rote memorisation to formative and competency-based evaluation:

- **Varied Methods:** Evaluation tools include:
  - Written tests specifically involving CT-focused puzzles
  - Interactive group
  - Qualitative tracking through a Teacher Observation Journal
- **Creative Focus:** The primary goal is to assess a student's ability to apply knowledge and demonstrate creativity in finding solutions

How to Use This Book?

This book is designed as a companion to the Mathematics textbook and is intended to be used alongside regular classroom teaching. Since it follows the same chapter sequence, the Mathematics teacher can seamlessly integrate it into daily instruction. As concepts are introduced in class, the corresponding questions from this book can be used to deepen understanding and encourage application.

Before beginning a chapter, the teacher is encouraged to go through the content of this book, identify the underlying concepts required for each question, and plan how to align them with classroom teaching. As these concepts are taught, the teacher can introduce the related thinking questions to students.

It is important to note that the questions in this book are thinking-based and designed to promote analysis, reasoning, and problem-solving. Teachers should adopt a facilitative approach, guiding students through prompts and discussions rather than directly providing solutions. Students should be given time to think and attempt independently, followed by classroom discussions where different approaches are shared and explored.

Some chapters also include activities that build intuition and engagement. These should be conducted before attempting the questions, as they help students approach the problems with better understanding.

Teachers should approach this book with the mindset that the process of thinking is more important than arriving at the correct answer. Creating a safe and encouraging environment where students feel comfortable making mistakes, exploring multiple strategies, and expressing their reasoning is essential. The goal is to nurture confident, independent thinkers rather than focus solely on correctness.

Chapter 1: We the Travellers - I

1. **Which of the following CAN be implied if the given statement is true?**
   Statement: A 5-digit number is formed using single-digit whole numbers such that the units digit is even and all the remaining digits are odd.

   a) The number definitely lies between 11111 and 99999
   b) The number formed CAN be a multiple of 100
   c) The sum of the digits of the largest such number is 44
   d) The sum of the digits is NOT divisible by 2

   Answer: c

   Solution:

   The statement says that a 5-digit number has an even digit in its units place and odd digits in all the other places.
   So, it's basically an even number.
   Now, let's check the possibility of each of the options being true.
   Option a: The number definitely lies between 11111 and 99999.
   We know that our 5-digit number has odd digits in all other remaining places other than the units place.
   11110 also satisfies this condition.
   However, 11110 < 11111 and this number does not lie between 11111 and 99999.
   So, the statement given in option a is False.
   Option b: The number CAN be a multiple of 100.
   5-digit multiples of 100 must have two 0s in the end, i.e. in units and tens place.
   As our number has an even digit only in the units place and other places have odd digits, the statement given in option b is False.
   Option c: The sum of the digits of the largest such number is 44.
   The largest number formed with the given condition will be 99998.
   9 + 9 + 9 + 9 + 8 = 44
   Hence, option c can be implied.
   Option d: The sum of the digits is NOT divisible by 2.
   As we know odd + odd = even, we have 4 odd digits which result in an even sum.
   And when the sum is added to the even digit, the resulting sum is an even number.
   So, the statement given in option d is False.
   Hence, option c is the correct answer.

---

2. **Rohan revealed his 5-digit phone password in a code word to Rajesh where all the digits are NATURAL NUMBERS. Which of the following statements are <u>SUFFICIENT</u> to crack the code?**
   Statement 1: One of these digits is 1, and 2 appears thrice in the password
   Statement 2: The first digit is smaller than all other digits and the 2nd digit is smaller than the 3rd
   Statement 3: The largest digit in the password is 3 and it appears only once

   a) Statements 1 and 2
   b) Statements 2 and 3
   c) All the statements are required
   d) Cannot be determined even after using all the statements

   Answer: b

   Solution:

   From the information provided in statement 3, we deduce that the largest digit in the password is 3, and it occurs only once. Statement 2 indicates that the first digit is smaller than all others, implying that the

first digit is 1. Further, it states that the second digit is smaller than the third, making the second digit 2, which is less than 3.

Consequently, the first three digits of the password are 123. Since the highest digit is 3 and appears only once, the remaining two digits must be either 1 or 2.

However, statement 2 emphasizes that the first digit is smaller than all others, eliminating the possibility of the remaining digits being 1. Therefore, the password is determined as 12322. Hence, only statements 2 and 3 are necessary to arrive at the correct password. Thus, the correct answer is option b.

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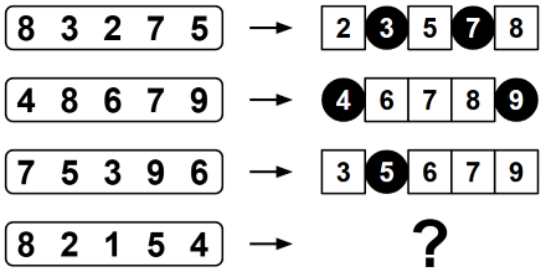
3. What will come in place of "?"



a) 

b) 

c) 

d) 

Answer: c

Solution:

Here, the terms on the left of the arrow are 5-digit numbers. On the right, the digits are arranged in ascending order. The digits that remain in the same position with respect to the original number are placed in the black circles and the remaining digits are placed in the white squares.

Based on the same rule, for the last term (8 2 1 5 4), arranging the digits in ascending order gives 1 2 4 5 8. Comparing positions with the original number, 2 and 5 remain in the same positions, so they are placed in black circles, and the rest in white squares, which matches option c. Hence, the correct answer is option c.

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4. A 5-digit number is formed such that all the digits are different, and the sum of all the digits is 10. What is the highest digit this number can have?

a) 3 b) 4 c) 5 d) 6

Answer: b

Solution:

To address this question, we need to form a 5-digit number with unique digits and the sum of all its digits is 10. If we use the highest single-digit numbers like 9, 8, and 7, the sum of all five digits will exceed 10.

By taking 6, we can have a sum of 10 as 6 + 1 + 1 + 1 + 1. However, we will not have unique digits. (The same issue exists with 5 as well).

Therefore, we must have smaller digits.

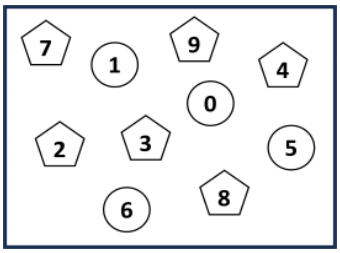
Let's consider 0, 1, 2, 3, and 4.

By selecting these distinct digits, we can create a 5-digit number where the sum of its digits equals 10. (4 + 3 + 2 + 1 + 0 = 10)

In this context, since we are searching for the highest digit, the maximum value we can use is 4.

Therefore, the highest digit for the 5-digit number is '4'. Hence, the correct answer is option b.

5. **Using the instructions given below, form two numbers.**
Instruction 1: Form the largest 5-digit number using the digits in the 5-sided figures, without repeating any digit.
Instruction 2: Form the smallest 3-digit number using the digits in the circles, without repeating any digit.
What is the sum of the two numbers formed?

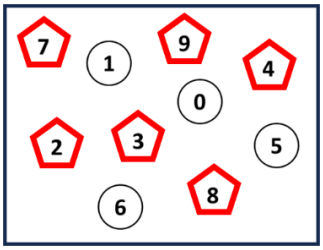


a) 99394 b) 93394 c) 98743 d) 98848

Answer: d

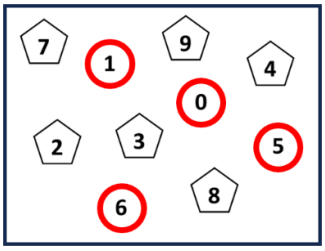
Solution:

Numbers in five-sided shapes are:



The largest five-digit number formed using these digits: 98743.

Numbers in circles are:



The smallest three-digit number formed using these digits: 105.

Thus, the sum of both the numbers formed is: 98743 + 105 = 98848.

Hence, the correct answer is option d.

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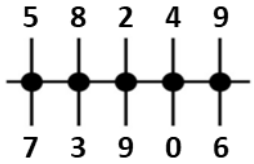
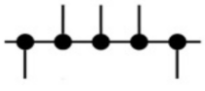
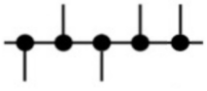
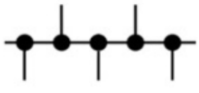
6. **Using the digits at the ends of the vertical lines, form numbers by reading the digits from left to right without rearranging them. Which option represents the greatest even number that can be formed?**

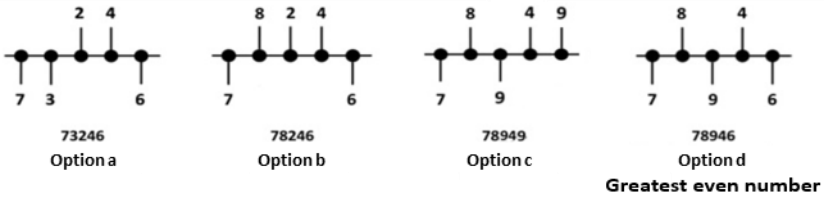


a)  b)  c)  d) 

Answer: d

Solution:

As shown in the image given below, option d makes the largest even number by reading the digits from left to right without rearranging them, which is 78,946. Hence, the correct answer is option d.



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7. **A string of digits is given below. At MINIMUM, how many pairs of digits (may or may not be adjacent to each other) must be interchanged such that the second largest 5-digit number is formed from left to right?**

Note: *A digit can change its position any number of times*

Left **0 7 3 6 5** Right

a) 2 b) 3 c) 4 d) 5

Answer: b

Solution:

The digits given are **0, 7, 3, 6, and 5**.

The **largest 5-digit number** that can be formed using these digits is **76530** (arranging the digits in descending order).

To get the **second largest 5-digit number**, the digits in the **higher place values must remain the same**. Any change in these places would make the number much smaller.

Therefore, we only interchange the **last two digits (tens and ones place)**.

Thus, the **second largest 5-digit number** formed is **76503**.

Now, we find the **minimum number of digit swaps** required to change **07365 - 76503**.

String **0 7 3 6 5**

Target Number **7 6 5 0 3**

Here, we can see that interchanging 3 and 5 will make both these digits have their target positions. As one interchange sorts two place values, let's swap 3 and 5.

Interchange 1: 3 and 5

String **0 7 5 6 3**

Target Number **7 6 5 0 3**

Now, as all three remaining digits are in wrong positions, interchanging any two of them will sort only one place value in any possible case (interchanging 0-6, 0-7, or 6-7 will give only one correct position in each pair). For example, let's interchange 6 and 7.

Interchange 2: 6 and 7

String **0 6 5 7 3**

Target Number **7 6 5 0 3**

Then, only 6 will get its target position. (The same will be observed among other pairs too.)

Finally, interchanging the other two digits will give us the target value.

Interchange 3: 0 and 7

String **7 6 5 0 3**

Target Number **7 6 5 0 3**

Hence, the minimum number of interchanges required is 3. Thus, the correct answer is option b.

8. **There is a 7-digit number X in which all the digits are different. Using the digits of X, two 5-digit numbers Y and Z are formed, such that no digit is repeated within Y or within Z. What is the MINIMUM number of digits that Y and Z must have in common?**

a) 1 b) 2 c) 3 d) 4

Answer: c

Solution:

Let's assume the 7-digit number X is ABCDEFG.

Since we need the least (MINIMUM) number of digits to be common, we will minimize the use of repeated digits such that Y could be ABCDE and Z could be CDEFG.

As we can see, C, D, and E are there in both numbers Y and Z.

Thus, Y and Z will have at least three same digits.

Hence, the correct answer is option c.

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9. **A 5-digit number has the property that the number formed by its first three digits is the same as the number formed by its last three digits (without changing the order of digits). What is the minimum number of times any digit can appear in this number?**

a) 3 b) 1 c) 2 d) 5

Answer: c

Solution:

The number has **5 digits**, and the **first three digits must be exactly the same as the last three digits**.

However, a 5-digit number cannot contain **six separate digits**. Therefore, the **middle digit (3rd digit)** becomes common to both groups of three digits. In other words, this digit is **counted in both the first three and the last three digits**.

Because of this overlap, the **shortest repeating pattern** that satisfies the condition is **ABABA**, where **A and B are different digits**.

In this pattern:

- **A appears 3 times**
- **B appears 2 times**

Thus, the **minimum number of times a digit appears is 2**.

The number cannot contain **more than two different digits**, otherwise the first three and last three digits would not remain identical.

If the number used **only one digit** (for example, **AAAAA**), then a digit would appear **5 times**, which is **not the minimum possible case**.

Therefore, the valid pattern is **ABABA**, where the **least number of times a digit appears is 2**.

Hence, the correct answer is option c.

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10. **Which digit appears in the tens place of the second largest 5-digit number formed using 1, 5, and 7, where each digit is used at least once?**

a) 5 b) 7 c) 1 d) Either a or c

Answer: c

Solution:

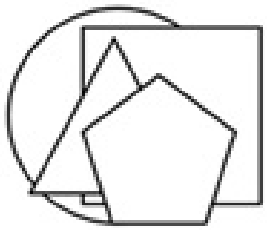
The largest 5-digit number formed using 1, 5, and 7, where each digit is used at least once is 77751.

The second largest 5-digit number formed will be 77715.

So, 1 appears in the tens place. Hence, the correct answer is option c.

The Thinking Spot

P, Q, R, and S each has a different shape - Circle, Pentagon, Square, and Triangle (not necessarily in the same order). They arranged the shapes as shown below, where the Circle is placed at the bottom-most position.
• S placed his shape immediately above P's shape
• There are exactly 2 shapes placed above R's shape
Which of the following is Q's shape?



(a) Circle (b) Square (c) Pentagon (d) Triangle
Answer: A
Solution:
Step 1: Identify the order in which the shapes are placed.
As mentioned in the question, the Circle is at the bottom-most position.
Clearly, the Pentagon is the topmost shape, as no other shape is overlapping it.
Between the Square and Triangle, the Triangle is on top of the Square, as the upper corner of the Triangle is clearly overlapping the Square.
Hence, the order of the shapes from top to bottom is:
Pentagon - Triangle - Square - Circle.

Step 2: Based on the information provided, assign each shape to the respective person.
S placed his shape immediately above P's shape.
Pentagon cannot be P's shape, as there would be no scope for the shape of S above it.
So, P's shape can either be Circle, Square or Triangle.
There are exactly 2 shapes placed above R's shape.
As per our order, the Square has two shapes above it.
Hence, **R's shape = Square.**

So, P's shape cannot be the Square too.
Also, if P's shape is Circle, then the Square must be the shape of S, which is not possible.

Thus, **P's shape = Triangle** and the Pentagon (above the triangle) must be the shape of S.

Therefore, Circle belongs to Q. Option a is the correct answer.

Chapter 2: Fractions

1. **Sam has some chocolates. He gave 1 more than half the chocolates to A and 1 less than half the chocolates (of the original number of chocolates) to B. What is the difference between the number of chocolates given to A and B?**

   a) 0 b) 1

   c) 2 d) Cannot be determined

   Answer: c

   Solution:

   Let's assume that Sam has a '2x' number of chocolates.

   So, half of the number of chocolates with Sam will be (2x)/2 = x.

   Sam has given 1 more than half the chocolates to A.

   So, he has given 'x + 1' chocolates to A ------(1)

   Sam has given 1 less than half the chocolates to B.

   So, he has given 'x – 1' chocolates to B --------(2)

   Now, we need to find out the difference between the number of chocolates given to A and B.

   From (1) and (2), the difference would be:

   (x + 1) – (x – 1)

   = x + 1 – x + 1

   = 2

   Hence, option c is the correct answer.

---

2. **Three groups of people - A, B, and C - each have the same number of members. They take part in three activities: 1, 2, and 3.**
   - **Each person within a group can only be part of one activity**
   - **Half of Group A does Activity 1, which is also done by all members of Group B**
   - **Half of Group C does Activity 3, which is also done by the remaining members of Group A**
   - **All remaining people do Activity 2**

   Which activity is done by the least number of people?

   a) Activity 1 b) Activity 2

   c) Activity 3 d) Both options a and b

   Answer: b

   Solution:

   Let activity 1 be named as A1, activity 2 be named as A2, and activity 3 be named as A3.

   1. Half of group A does activity 1 which is also done by all the people in group B. Therefore,

   Group A: (1/2) A1 + ?

   Group B: A1

   Group C: ?

   2. Half of group C does activity 3 which is also done by the remaining people of group A.

   Group A: (1/2) A1 + (1/2) A3

   Group B: A1

   Group C: (1/2) A3 + ?

   3. Remaining people are doing activity 2

   Group A: (1/2) A1 + (1/2) A3

   Group B: A1

   Group C: (1/2) A3 + (1/2) A2

   Hence, we can see that Activity 2 is done by the least number of people. Therefore, the correct answer is option b.

3. **If $ = 12, @ = half of 12, and # = quarter of 12, then find the value of:**

   $ x @ – #

   a) 68 b) 69 c) 59 d) 36

   Answer: b

   Solution:

   It is given that $ = 12,

   @ = half of 12 which is 12/2 = 6.

   # = quarter of 12 which is 12/4 = 3.

   On substituting the values:

   $ x @ – #

   = 12 x 6 – 3

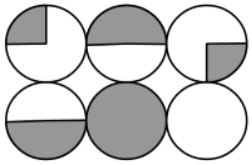
   = 72 – 3

   = 69

   Hence, the correct answer is option b.

---

4. **What fraction of the total area of all the circles is shaded grey?**



   a) 10/24 b) 5/6 c) 5/24 d) 14/24

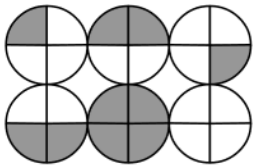
   Answer: a

   Solution:

   In the question image, we can see that the smallest portion of a shaded circle is a quarter of a circle. So, it is easy for us to consider that each circle has four quarters and there are six circles. So, 6 x 4 = 24 quarters are present in the image, out of which 10 quarters are shaded.

   Hence, 10 out of 24 quarters are shaded. 10/24 is the answer.

   Option a is correct.



---

5. **A piece of land is distributed between Raj and Rahul. Raj receives 1/2 of the total land, and Rahul receives land equal to 1/2 of what Raj receives. What fraction of the land remains undistributed?**

   a) 1/2 b) 1/8

   c) 1/4 d) The land is distributed completely

   Answer: c

   Solution:

   Raj receives **1/2 of the total land**, so the **remaining land is also 1/2**.

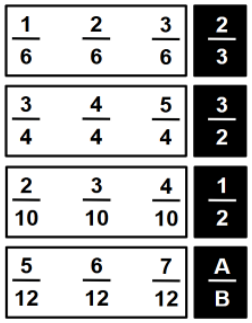
   Rahul receives land equal to 1/2 of what Raj receives, which is equivalent to 1/2 of 1/2 = 1/4.

   So, Rahul receives 1/4 of the total land.

   Since **1/4 is half of 1/2**, the distributed land from the remaining portion becomes **1/4**, and the other **1/4** is left.

   Therefore, **1/4 of the total land remains undistributed**, and the correct answer is **option c**.

6. If each row follows the same theme, what will come in place of A and B?



a) A = 8, B = 12 b) A = 2, B = 3 c) A = 3, B = 2 d) A = 1, B = 6

Answer: b

Solution:

In every row, the term written in the black box is the simplest form of the fraction that comes after the first three terms of the row.

For example, in the first row, the fraction that comes after 1/6, 2/6 and 3/6 is 4/6.

The simplest form of 4/6 is 2/3.

Similarly, in the last row, the fraction that comes after 5/12, 6/12 and 7/12 is 8/12.

The simplest form of 8/12 is 2/3.

Hence, A/B = 2/3.

A = 2 and B = 3

Hence, the correct answer is option b.

---

7. Which of these options can we conclude from the following statement?
Statement: Three-quarters of total coins that Kiran has are of denomination five rupees.

a) All coins that Kiran has are of more than 2 rupees
b) All coins that Kiran has are of less than 10 rupees
c) Only one-fourth of the coins with Kiran are not of five rupees
d) Kiran has 30 coins of denomination five rupees

Answer: c

Solution:

a) All coins that Kiran has are of more than 2 rupees

This tells us the value of the coins but does not tell us how many are five-rupee coins.

So, we cannot conclude anything about three-quarters being five-rupee coins.

Therefore, this option cannot be concluded from the given statement.

b) All coins that Kiran has are of less than 10 rupees

Again, this tells us only the *range* of coin values.

It does not say how many five-rupee coins Kiran has.

Therefore, this option cannot be concluded from the given statement.

c) Only one-fourth of the coins with Kiran are not of five rupees

If one-fourth are not five-rupee coins, the remaining three-fourths MUST be five-rupee coins.

For example, if Kiran has 40 coins:

- One-fourth (10 coins) are not of 5 rupees
- The remaining three-fourths (30 coins) are of 5 rupees

So, only o**ption c** directly tells us that **three-quarters of Kiran's coins are of five rupees**.

Therefore, this option can be concluded from the given statement.

d) Kiran has 30 coins of denomination five rupees

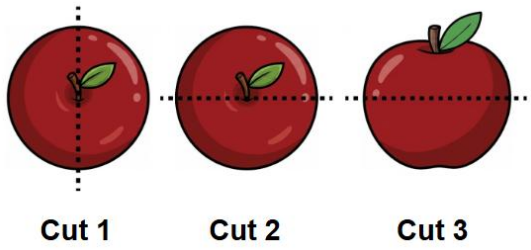
We know only the number of five-rupee coins, but we do not know the total number of coins Kiran has.

Without the total, we cannot check whether 30 coins are three-fourths or not.

Therefore, this option cannot be concluded from the given statement.
Thus, option c is the correct answer.

---

8. Sam makes three cuts on the same apple, as shown by the dotted lines in the image below. Altogether, how many pieces of apple will he have?

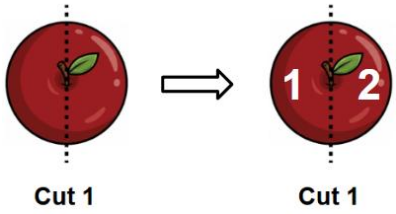


a) 6 b) 7 c) 8 d) 9

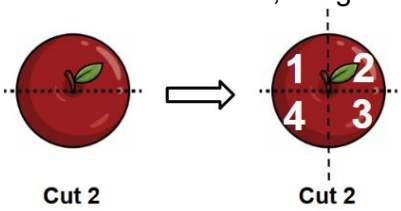
Answer: c

Solution:

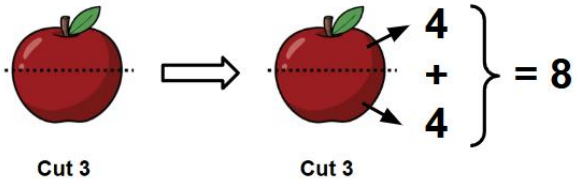
Cut 1: When the apple is cut along the vertical dotted line by cut 1, we get 2 pieces as shown below:



Cut 2: As the apple has already been cut into 2 pieces by cut 1, when the apple is further cut along the horizontal dotted line, we get 4 pieces altogether.



Cut 3: Then, cut 3 will result in double the existing number of pieces, where the upper half has 4 pieces, and the lower half has 4 pieces.



In this way, the apple gets divided into 8 pieces in 3 cuts.
Hence, option c is correct.

---

9. If you take 6 times of me, you will get a whole and a half. If you take me out of a whole, you are left with three times of me. Who am I?

a) Half b) Quarter c) Whole d) Zero

Answer: b

Solution:

A whole and a half mean **1 and ½**.

As we have 1 and ½, and we know that a whole has 2 halves, then we have three halves altogether (whole and a half = ½ + ½ + ½)

Now imagine dividing these three halves into **6 equal small pieces**.
So, if you break 1½ into 6 equal parts, each small part will be **one-fourth (¼)**. (As a quarter is nothing but half of half).
Let's check the answer by comparing it with the next statement, too.
The second clue says that when this number is taken out from a whole, the remaining part equals three times the same number.
This means a whole is made up of four equal parts, because removing one part leaves three equal parts behind. Therefore, the number is **one-fourth (¼)**.
Option b is correct.

---

10. In a chocolate shop, four buyers come in one by one to buy chocolates. Each buyer purchases half of the chocolates that are currently in the shop. For example, if there are X chocolates initially, the first buyer buys X/2 chocolates. Then, from the remaining chocolates, the second buyer buys half. This process continues until the fourth buyer, who buys only 1 chocolate. How many chocolates were there in the shop initially?

a) 8 b) 32 c) 16 d) 20

Answer: c

Solution:

If there are X chocolates in the shop initially, the buying process proceeds as follows:
The 1st buyer buys X/2 chocolates.
The 2nd buyer buys half of the remaining chocolates, which is X/4.
The 3rd buyer buys half of the chocolates left after the second buyer, which is X/8.
The 4th buyer buys half of the chocolates remaining after the third buyer, which is X/16.
It is given that the 4th buyer buys only 1 chocolate. Therefore, we can set up the equation:
X/16 = 1
X/16 = 1/1 = 16/16
X = 16
Hence, the correct answer is option c.

Given below is a set of 8 cards, each having a WHOLE NUMBER on it. Cards A, B, C, and D represent numbers that are either one more or one less than the number on the card directly above them. If all 8 numbers on these cards are different, what is the sum of B and C?

1	4	6	3
A	B	C	D

(a) 12
(b) 10
(c) 11
(d) Cannot be determined

Answer: A

Solution:

It is mentioned that all 8 cards have different digits and 1, 4, 6, and 3 are already present in the first row.
Hence, A, B, C, and D can take unique values from among 0, 2, 5, 7, 8, and 9 only.

1	4	6	3
A	B	C	D

Now, card A has 1 above it. As it is mentioned that each letter represents a value either 1 more than or 1 less than the number above it, A can either be 0 or 2.

1	4	6	3
A	B	C	D

However, if A is 2, then D, which is below 3 can represent only 4. This is not possible as 4 is already present.

1	4	6	3
A	B	C	D

Hence, A represents 0 and D represents 2.

1	4	6	3
0	B	C	2

Now, B, which is below 4 must represent only 5, as 3 is already present.
As a result, the value of C will be 7, as C has 6 above it and can represent only 5 or 7 as per the condition.

1	4	6	3
0	5	7	2

Clearly, B = 5 and C = 7.
Hence, B + C = 5 + 7 = 12, and option a is the correct answer.

Chapter 3: Angles as Turns

1. **P and Q are standing in a playground. P took a right-angle turn in the clockwise direction and Q took a right-angle turn in the anti-clockwise direction, and now both of them face the same direction. If P is currently facing North, which direction was Q initially facing?**

   a) East
   b) West
   c) South
   d) Cannot be determined

   Answer: a

   Solution:

   P turned by a right angle in clockwise direction, and Q turned by a right angle in anti-clockwise direction to face the same direction.

   As P is currently facing North, Q must also be facing North.

   So, Q turned by a right angle in an anti-clockwise direction to face the North.

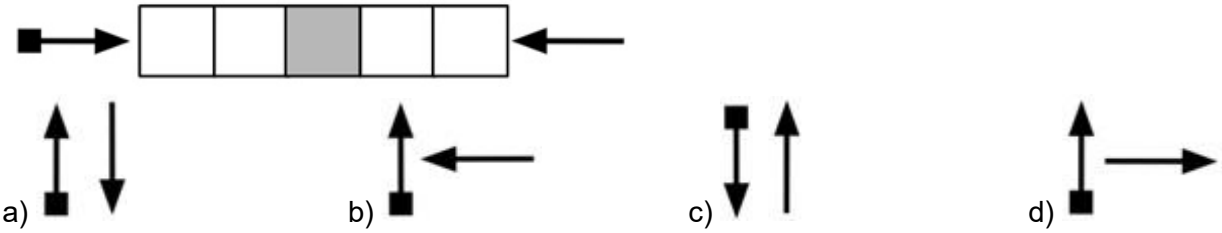
   We know that 1 right angle turn in anti-clockwise direction from East gives us North.

   So, Q must be initially facing towards the East.

   Option a is the correct choice.

---

2. **Two arrows must pass through five blocks to reach the opposite side, making a right-angle clockwise turn each time they enter a block. Which of the following options shows the correct positions of these arrows when they are present in the shaded block?**

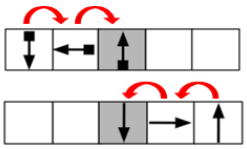


   Answer: a

   Solution:

   Each arrow rotates by a right angle in the clockwise direction each time it enters a block.

   The positions of these arrows as they travel through the blocks are shown in the image below:



   As we can see, when the arrows are in a grey block, they would look like the ones shown in option a.

   Hence, option a is the correct answer.

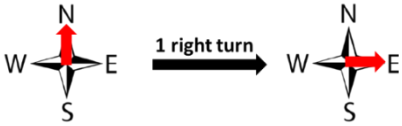
3. **Prachi is facing North. She takes a right-angle turn in the clockwise direction. She then takes a right-angle turn again in the clockwise direction. What direction is she facing now?**

a) North b) East c) West d) South

Answer: d

Solution:

First, Prachi took a right-angle turn in the clockwise direction, which means she turned right from the north.



Then, Prachi took a right-angle turn in the clockwise direction from the east.

In the end, Prachi took two right turns and ended up facing south.

Hence, the correct answer is option d.

---

4. **The given question image could be rotated clockwise or anticlockwise multiple times. Which of the following options will you NOT get on rotating the given question image?**


Question Image

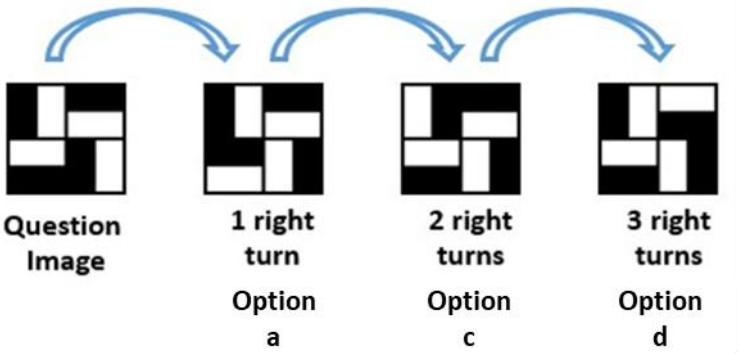
a)  b)  c)  d) 

Answer: b

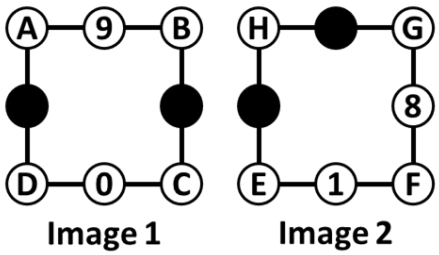
Solution:

Image in option b cannot be obtained on rotating the question image.

Hence, the correct answer is option b.



5. Sam rotates Image 2 by a right-angle clockwise turn. If Tom places the rotated Image 2 on Image 1, which of the following statements is NOT true?

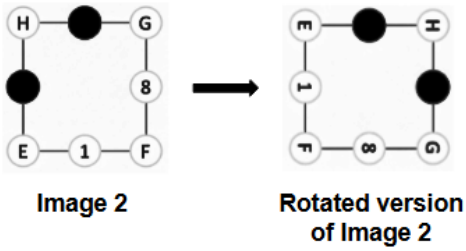


a) A and E overlap with each other
b) 9 and 8 are opposite to each other
c) F and B are diagonal to each other
d) 9 and 1 overlap with each other

Answer: d

Solution:

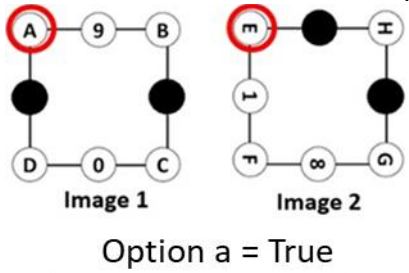
Let's first rotate image 2 by a right angle, clockwise.
The rotated version can be seen below:



Now, check each option one by one.
Compare the resultant positions of the letters/digits when rotated image 2 is placed on top of image 1.

Option a:

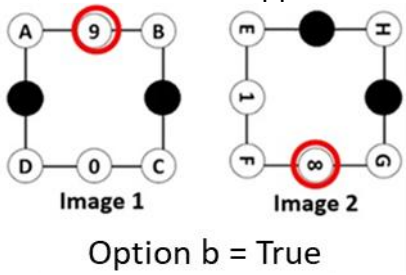
As we can see, A and E overlap with each other, as they're in the same positions on both the grids.



Thus, option a is TRUE.

Option b:

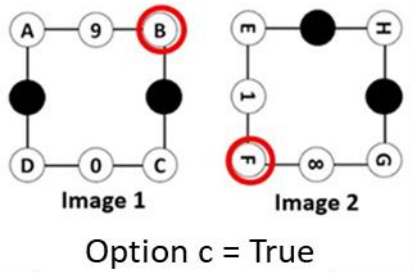
As we can see, 9 is on the top edge of image 1 and 8 is on the bottom edge of image 2 (after rotating image 2).
So, 9 and 8 will be opposite to each other, after placing image 2 on top of image 1.



Thus, option b is TRUE.

Option c:

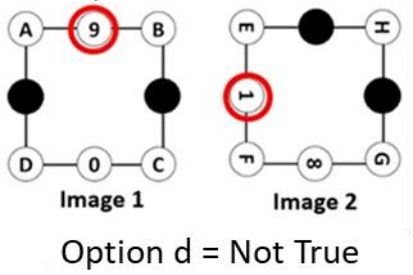
As we can see, B is at the top-right corner of image 1 and F is at the bottom-left corner of image 2. Hence, F and B will be diagonal to each other, in the final arrangement.



Thus, option c is TRUE.

Option d:

As we can see, 9 and 1 are at different positions in their respective images.
So, they DO NOT overlap with each other, finally.



Thus, option d is **NOT TRUE.**
Hence, option d is the correct answer.

---

6. Pratik is facing north. He first makes a 1/4 clockwise turn, followed by a 1/2 anti-clockwise turn. In which direction was he facing at the end?

a) North b) East c) West d) South

Answer: c

Solution:

A **full turn** means turning all the way around, which is **4 right angles (360°)**.
So, we divide the full turn into **4 equal parts**.

- **1/4 turn** = **one right-angle turn**
- **1/2 turn** = **two right-angle turns**

Now apply this to the question:

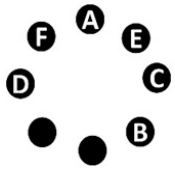
- **1/4 clockwise turn** means **one right-angle turn**.
- **1/2 anticlockwise turn** means **two left-angle turns**.

Now look at the turns together:

- **1 right-angle turn + 2 left-angle turns**

One **right-angle turn and one left-angle turn cancel each other**, so we are left with **one left-angle turn**. Starting from **North**, one **left-angle turn** will make Pratik face **West**. Hence, option c is the correct answer.

7. **A, B, C, D, E, and F are seated around a table, facing the centre, with two chairs left empty, as shown below. Two new members join the group. E, C, and B move one seat clockwise, while D and F move one seat anticlockwise. After these changes, the new members occupy the empty chairs. Who is sitting between the two new members?**

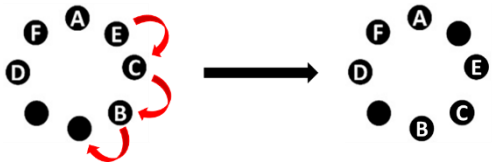


a) A b) B c) E d) F

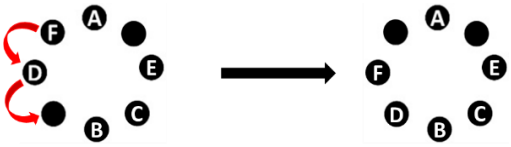
Answer: a

Solution:

E, C, and B move one seat clockwise. The changes in position are shown below:



D and F move one seat anticlockwise. The changes in position are shown below:



Finally, the empty seats would be available on either side of A, as shown in the image above.
Thus, A will be sitting between the new members. Hence, the correct answer is option a.

---

8. **Rohan and Kamini are facing East. Rohan takes 2 quarter turns in clockwise direction and Kamini takes 2 quarter turns in anti-clockwise direction and then Kamini takes 1 quarter turn in clockwise direction. Which of the following will lead Kamini and Rohan to face opposite directions?**

a) Rohan taking 1 quarter turn in a clockwise direction
b) Kamini taking 1 quarter turn in a clockwise direction
c) Rohan taking 2 quarter turns in an anti-clockwise direction
d) Both options a and b

Answer: b

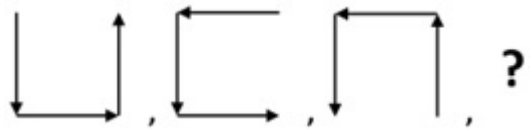
Solution:

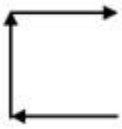
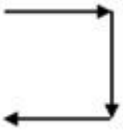
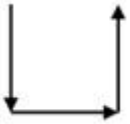
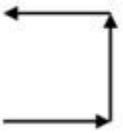
Breaking it down step by step:

- Initially, Rohan and Kamini both face East.
- Rohan takes 2 quarter turns in clockwise direction, positioning himself facing West.
- Kamini, on the other hand, takes 2 quarter turns in anti-clockwise direction and 1 quarter turn in clockwise direction. However, the anti-clockwise and clockwise turns cancel each other out, leaving her with only 1 quarter turn in anti-clockwise direction, resulting in her facing North.
- For Kamini and Rohan to face in opposite directions, Kamini needs to take one more quarter turn in the clockwise direction.

Hence, the correct answer is option b.

9. What will come in place of "?" in the given series?

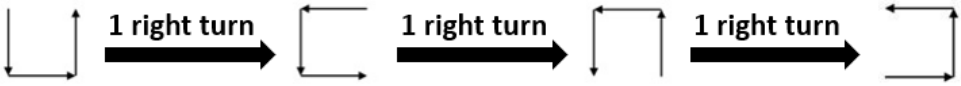


a)  b)  c)  d) 

Answer: d

Solution:

In the given series, each term is formed by rotating the previous term by a right angle in the clockwise direction.



Following this logic, the answer will be option d, as shown in the image above.

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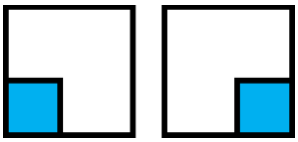
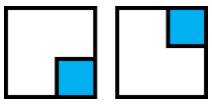
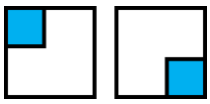
10. If both the blue boxes shift to the next corner in clockwise direction, how will the image look after the shift?



a)  b)  c)  d) 

Answer: d

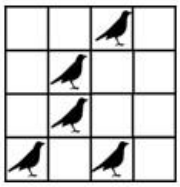
Solution:

As shown below, when both blue boxes move to the next corner in the clockwise direction, the figure will look like option d. Thus, option d is the correct answer.

Option d

In the grid given below, colour some of the empty blocks such that each bird has exactly one coloured block adjacent to it. What is the MINIMUM number of blocks that need to be coloured?

Note: *For two blocks to be adjacent they MUST share one common side. Blocks having only a common corner are not adjacent*

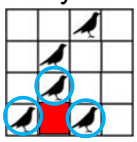


(a) 2 (b) 3 (c) 4 (d) 5

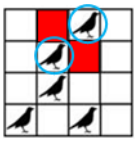
Answer: A

Solution:

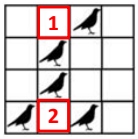
We need to find the minimum number of empty blocks that need to be coloured so that every bird has exactly one adjacent coloured block.



On colouring the above highlighted block, we will be able to satisfy the condition for three birds, which is the highest possible number of birds, with just one block. Hence this block will be coloured.



The birds in the first two rows each need one coloured block adjacent to them. They share two common adjacent blocks, as shown. By colouring either of them, the remaining birds will each have one adjacent coloured block. As shown below, only two blocks need to be coloured for every bird to have exactly one coloured block next to it.



Hence, option a is correct.

Chapter 4: We the Travellers - II

1. **Which statement is DEFINITELY true about a five-digit number that consists of three odd digits and two even digits?**

   a) The sum of all the 5 digits is an odd number
   b) The sum of all the 5 digits is an even number
   c) The sum of all the 5 digits is a prime number
   d) Cannot be determined

   Answer: a

   Solution:

   Consider a five-digit number consisting of three odd digits and two even digits. Expressing this, we get: Odd + Odd + Odd + Even + Even.
   We know that the sum of two odd numbers is even. Therefore, the expression simplifies to:
   Even + Odd + Even + Even.
   Now, adding even numbers together always results in an even sum (even + even + even = even). Therefore, the expression further simplifies to: Even + Odd = Odd.
   This proves that the sum of the digits of a five-digit number that consists of three odd digits and two even digits is an odd number.
   To illustrate, take the example of the digits 1, 2, 3, 4, and 5. The sum of these digits (1 + 2 + 3 + 4 + 5) is 15, which is indeed an odd number.
   Hence, the correct answer is option a.

---

2. **A has 5 gold coins and B has 7 silver coins. B can exchange 2 silver coins for 1 gold coin with A. If B exchanges as many coins as possible, what will be the total number of coins (both gold and silver) with A at the end?**

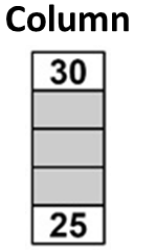
   a) 8 b) 6 c) 5 d) 2

   Answer: a

   Solution:

   A has 5 gold coins, and B has 7 silver coins. B can exchange 2 silver coins for 1 gold coin with A. This means:
   • 1 gold coin = 2 silver coins
   B wants to exchange as many silver coins as possible. Since B has 7 silver coins and can only exchange them in multiples of two, the maximum he can exchange is 6 silver coins. For these 6 silver coins, B will receive:
   • 6 silver coins ÷ 2 = 3 gold coins
   So, B gives 6 silver coins to A and receives 3 gold coins in return.
   Final count of coins with A:
   • Gold coins: A initially had 5 gold coins but gave 3 to B, so A now has:
   5 - 3 = 2 gold coins
   • Silver coins: A receives 6 silver coins from B, so A now has:
   0 + 6 = 6 silver coins
   Total coins with A:
   • Total coins = 2 gold coins + 6 silver coins = 8 coins
   Hence, the total number of coins with A at the end is 8. Thus, the correct answer is option a.

3. **In how many different ways can you fill in all the shaded cells such that the numbers in the column are arranged in descending order and each cell has a unique number?**



a) 2 b) 3 c) 4 d) 5

Answer: c

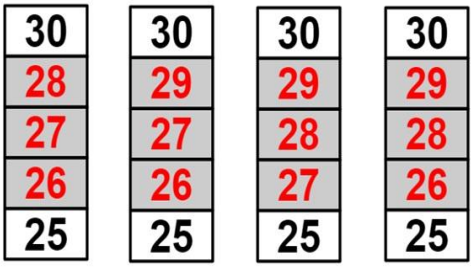
Solution:

The numbers in the column should be arranged in descending order.

• The number at the top is 30, and the number at the bottom is 25

• The possible numbers that can fill the 3 empty cells are 26, 27, 28, and 29

The possible arrangements of these numbers in the shaded cells are shown below:



The number of possible arrangements is **4**. Hence, the correct answer is option c.

---

4. **John has Rs. 12 with him. He went to a shop and bought 3 balls and 2 balloons. After buying these items, he still has Rs. 2 remaining, which is exactly the cost of 1 ball. What is the cost of 1 balloon?**

a) Rs. 1 b) Rs. 2 c) Rs. 3 d) Rs. 4

Answer: b

Solution:

Out of the Rs. 12, he has only Rs. 2 left with him, which means he spent Rs. 10.

The cost of 1 ball is Rs. 2. If 1 ball costs Rs. 2, then 3 balls would have cost Rs. 6.

So, the remaining Rs. 4, he spent on buying 2 balloons.

This means that each balloon costs Rs. 2.

Hence, the correct answer is option b.

---

5. **If you add 1 to the digit in the ones place and subtract 2 from the digit in the tens place in the numbers given below, how many of the new numbers will be even?**

4434, 2655, 3561, 1636, 1253, 8094, 1371, 3038, 2335, 1045

a) 5 b) 6 c) 7 d) 8

Answer: b

Solution:

We are told to **add 1 to the digit in the ones place and subtract 2 from the digit in the tens place for each number**. However, to check whether the *resulting number* is even, we only need to look at the **final units digit**, because a number is even if its units digit is even.

Since we **add 1** to every units digit:

- If the original units digit is **odd**, then odd + 1 = **even**
- If the original units digit is **even**, then even + 1 = **odd**

So, **only numbers that originally end in an odd digit** will become even after the change.

Step 1: Identify numbers ending in an odd digit

From the given list:

4434 - ends in 4 (even)
2655 - ends in 5 (**odd**)
3561 - ends in 1 (**odd**)
1636 - ends in 6 (even)
1253 - ends in 3 (**odd**)
8094 - ends in 4 (even)
1371 - ends in 1 (**odd**)
3038 - ends in 8 (even)
2335 - ends in 5 (**odd**)
1045 - ends in 5 (**odd**)

Step 2: Count them

Numbers ending in an odd digit:

2655
3561
1253
1371
2335
1045

Total = **6 numbers**

So, the answer is option b.

---

6. You have to place 4 numbers from 1, 2, 3, 4, and 5 in the squares below to satisfy the given comparisons. How many different arrangements of numbers are possible if box B contains number 1? Note: *You cannot use the same number twice in the same arrangement*

a) 8 b) 9 c) 11 d) 12

Answer: d

Solution:

We are told:

The numbers must satisfy: **A > B < C < D**

- **B contains 1**, so we only have **2, 3, 4, 5** left for A, C, and D
- We must place the remaining three numbers in A, C, and D such that:

1. **A > 1**
2. **C > 1**
3. **D > C**

Since every number (2, 3, 4, 5) is already greater than 1, the only real condition we must satisfy is: C < D

So, we must count how many ordered pairs (C, D) can be made from {2, 3, 4, 5} where C < D.

Then the remaining number automatically goes to A.

Step 1: List all valid (C, D) pairs where C < D

Using the set {2, 3, 4, 5}:

- If C = 2, then D = 3, 4, 5 - **3 pairs**

- If C = 3, then D = 4, 5 - **2 pairs**
- If C = 4, then D = 5 - **1 pair**

Total valid (C, D) pairs = **3 + 2 + 1 = 6**
These are:
1. (2, 3)
2. (2, 4)
3. (2, 5)
4. (3, 4)
5. (3, 5)
6. (4, 5)

Step 2: For each pair, A can be any of the remaining numbers
For each (C, D) pair, one number remains unused.
That number goes to A (since any number > 1 works for A).
For example:
- If (C, D) = (2, 3), leftover = 4 or 5 - **2 possibilities**
- If (C, D) = (2, 4), leftover = 3 or 5 - **2 possibilities**
- If (C, D) = (2, 5), leftover = 3 or 4 - **2 possibilities**
- etc

Each of the 6 pairs gives **2 possible arrangements**.
Total arrangements:
Total = 6 pairs × 2 choices for A
= 12 arrangements
Hence, the correct answer is option d.

---

7. Bob has 4 coins with different values: 2, 4, 6, and 8.
Coin C is worth more than Coin A.
The total value of Coins B and C is equal to the value of Coin D.
Which TWO coins can Bob use to buy a candy that costs Rs. 14?

a) Coins A and D b) Coins B and D c) Coins A and C d) Coins C and D

Answer: d
Solution:
Let's assign values to the coins based on the given conditions:
1. The coins have values 2, 4, 6, and 8
2. Coin C is worth more than Coin A, so C > A
3. The sum of Coins B and C equals Coin D, meaning B + C = D

Now, let's determine the values of each coin:
Setting D = 6, we get:
B + C = 6
2 + 4 = 6
If B and C are assigned the values 2 and 4, then A must be given the highest value, which is 8. However, this would make A greater than C, contradicting the given condition.
• Suppose D = 8 (the highest value coin)
• For B + C = D, we need two coins that sum to 8
• The only possible pair is B = 2 and C = 6
• Since C (6) is greater than A, we set A = 4

Now, Bob needs two coins that sum to 14:
• The available coins are 2, 4, 6, and 8
• The only pair that sums to 14 is 6 and 8

Answer:

Bob can use Coin C (6) and Coin D (8) to buy the candy worth Rs. 14.
Hence, the correct answer is option d.

---

8. How many different three-digit even numbers can you make using the digits given below?
Note: *You can use any one, any two, or all the digits, and you may repeat the digits*

5 0 9

a) 3 b) 4 c) 5 d) 6

Answer: d

Solution:

To form a three-digit even number, the last digit must be even.
From the digits 5, 0, and 9, the only even digit is **0**.
So, the units place must be **0**.
This means every number will look like: **_ _ 0**
Now we can choose the hundreds and tens digits from 5, 0, and 9.
Digits can be repeated, so we list all possible combinations:

- 5 in hundreds place and 5 in tens place - 550
- 9 in hundreds place and 9 in tens place - 990
- 5 in hundreds place and 9 in tens place - 590
- 9 in hundreds place and 5 in tens place - 950
- 5 in hundreds place and 0 in tens place - 500
- 9 in hundreds place and 0 in tens place - 900

So, we can form **6** different three-digit even numbers. Hence, the correct answer is option d.

---

9. X is a 4-digit number which has only even numbers and only 2 unique digits. What could be the minimum value of the sum of the digits of the number X?

a) 2 b) 4 c) 8 d) 12

Answer: a

Solution:

Since we have to look for the minimum value, we should make this 4-digit number with the smallest digits possible.

The two smallest even numbers are 0 and 2.

The number must be 4-digit and contain exactly two unique digits.

Now, the number must be 4-digit, so the first digit cannot be 0. Therefore, the first digit must be 2.

To keep the sum of the digits as minimum as possible, we should avoid repeating 2 more than necessary. If we repeat 2 (for example: 2200 or 2220), the sum of the digits increases.

So, to get the minimum sum, we use 2 only once and fill the remaining places with 0.

Four-digit number using 0 and 2 = 2000. Thus, the sum of digits = 2 + 0 + 0 + 0 = 2

Hence, the correct answer is option a.

10. A, B, and C each walk a certain distance.

- The person who covered the least distance walks 25 km, and another person walks 6 times this distance

- C walks 12 km more than B, while A did not cover the least distance

If only two among A, B, and C are allowed to walk further, how many more kilometres must they walk so that their COMBINED distance (from the start) equals the distance walked by the third person?

a) 92 km b) 78 km c) 88 km d) 62 km

Answer: c

Solution:

Given:

The least distance = 25 km and one person walks 6 × 25 = 150 km

C walks 12 km more than B.

So, the three distances must be:

25 km, 150 km, and one unknown value

Also, C = B + 12

Now, as it is given that the least distance is 25 km, C is not the person who walked the least, as he walked 12 km more than B.

Hence, either A or B must have walked 25 km.

But it is mentioned that A did not cover the least distance.

Hence, B = 25

Then, C = 25 + 12 = 37

A = 150 (highest value)

Then, the distances are 25 km, 37 km, and 150 km.

Only two among A, B, and C can walk further and the total distance that these two people walk together must be equal to the distance walked by the third person.

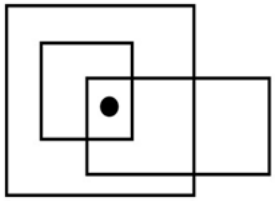
So, to satisfy the above condition, the person who walked the highest distance already, cannot walk further.

So, B and C must be walking further.

As they have already walked 25 + 37 = 62 kms, the distance that they should walk further will be 150 – 62 = 88 km

Hence, option c is correct.

Count the number of rectangles which contain the black circle.
Note: *Please count the squares also as rectangles for the purpose of this question*

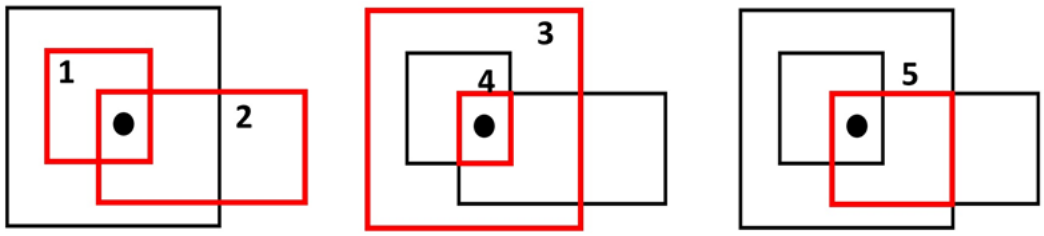


(a) 3 (b) 4 (c) 5 (d) 6

Answer: c

Solution:

There are 5 rectangles that contain the black circle in the given figure, as highlighted below. Hence, the correct answer is option c.



Chapter 5: Far and Near

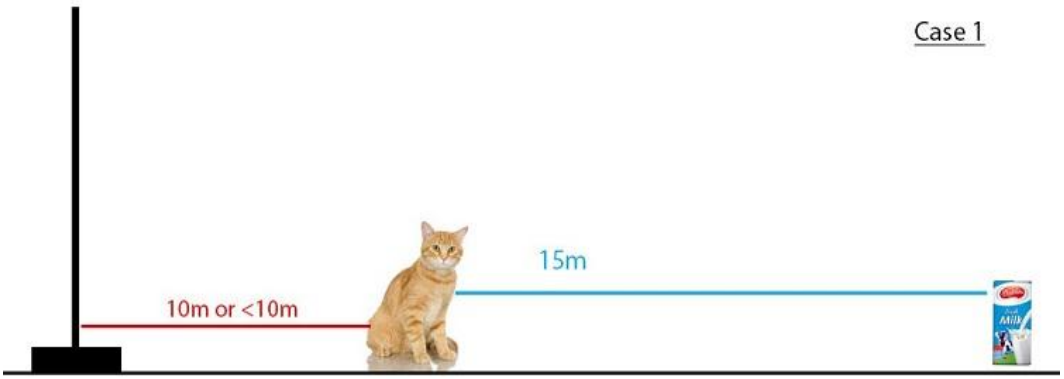
1. **Ram tied his cat to a small pole using a 10 feet long rope. At noon, Ram placed some milk 15 feet away FROM THE PLACE WHERE THE CAT WAS STANDING at that time. Can the cat reach the milk?**
   (Assume that the cat's body length is negligible and it is tied in middle of an open field)

   a) Definitely yes
   b) Definitely no
   c) Sometimes yes, sometimes no; it depends on the exact location of the milk
   d) None of these

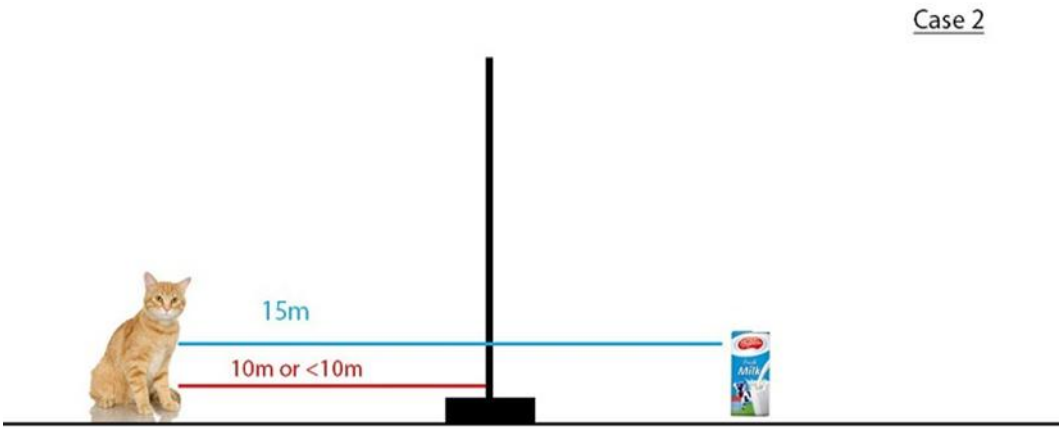
   Answer: c

   Solution:

   As seen in the image, in Case 1 when the cat is between the milk and the pole, then the cat may not be able to reach.



   In Case 2 when the cat and milk are on the either side of the pole, there may be a case where the cat can reach the milk.



   Hence, the answer is option c.

2. **Given below are the results for Javelin and High Jump competition.**
- Tom threw the javelin 12 m farther than Roy
- Kim jumped 1 inch higher than Roy
- Roy jumped 2 inches less than John
Which participant has secured the same position in both the sports?

Participants	Javelin throw (m)	Position	High jump (inches)	Position
Roy	40			
Tom			20	
John	34		29	1st
Kim	31			
Mary	58	1st	24	

a) Mary b) Tom c) Roy d) John

Answer: c

Solution:

1. Tom threw the javelin 12 m farther than Roy. Since Roy threw till 40 m, Tom would throw till 52 m.
2. Roy jumped 2 inches less than John. Since John jumped 29 inches, Roy would have jumped 27 inches.
3. Kim jumped 1 inch higher than Roy. Since Roy jumped 27 inches, Kim jumped 28 inches.

Thus, with the updated results, we can see in the table below that Roy secured the same position in both sports. Hence, the correct answer is option c.

Participants	Javelin throw (m)	Position	High jump (inches)	Position
Roy	40	3rd	27	3rd
Tom	52	2nd	20	5th
John	34	4th	29	1st
Kim	31	5th	28	2nd
Mary	58	1st	24	4th

---

3. **Soham collected 10 sticks, each measuring 6 cm. He breaks each stick into two equal halves. Using all the stick pieces, what is the maximum number of squares of side 3 cm he can form if each piece can be used only once and no piece can be shared by two squares?**

a) 3 b) 4 c) 5 d) 6

Answer: c

Solution:

If 10 sticks of 6 cm each are broken into two equal halves, there will be a total 20 sticks of 3 cm each. 4 sticks will be needed to make 1 square.

Therefore, at maximum a total of 5 squares can be made. Hence, the correct answer is option c.

---

4. **A snail moves forward by 3 cm in 1 minute, and then immediately after that moves backward by 2 cm in 1 minute. It follows the same rhythm in its movement. How much time will the snail take to reach the food placed 10 cm away for the first time?**

a) 20 minutes b) 10 minutes c) 4 minutes d) 15 minutes

Answer: d

Solution:

If a snail moves 3 cm forward in a minute and then immediately after that moves 2 cm backward in one minute, it is effectively moving 1 cm in 2 minutes.

To reach 7 cm, it will take 14 minutes.
In the 15th minute, it will move 3 cm more and reach the food at a distance of 10 cm.
Hence, the correct answer is option d.

---

5. A and B are two friends. They are standing at two opposite ends of a football field, which is 60 metres long. They both start running towards each other. A runs with a speed which is double the speed of B. There is a football at the centre of the field. When they meet each other, who is farther from the football?

a) A
b) B
c) Need to know the speed of A or B to know the distance
d) None of these

Answer: d

Solution:

The football is kept **exactly at the centre** of the 60-metre field.
So, it is **30 metres from A,** and **30 metres from B** initially.
A runs **twice as fast** as B, so A covers the distance faster.
But **they meet at a point that divides the field in the ratio of their speeds**.
Since A : B = 2 : 1,
A will cover **40 metres**, and
B will cover **20 metres** before they meet.
This meeting point is **40 metres from A's starting point**,
and since the ball is at 30 metres, the meeting point is **10 metres beyond the ball**.
But the key point is:
Both A and B meet at the same point.
So, at the moment they meet, **both are at exactly the same distance from the football**.
Therefore, no one is farther. Hence, the correct answer is option d.

---

6. I have to cut a 50-metre piece of cloth into sections of 1 metre each. How many cuts will I have to make at minimum? Note: *I cannot double up the cloth to make 2 layers*

a) 47 b) 48 c) 49 d) 50

Answer: c

Solution:

To cut 50 metre piece of cloth in 1 metre each, we will cut it in 50 pieces. To cut 50 metres into 50 pieces, 49 cuts are required, as the 49th cut will automatically give you two pieces.
A student can also think about how many cuts will be required to cut a cloth into two pieces - ONE; to cut into three pieces - TWO.
So, the number of cuts required is always one less than the number of pieces required.
Hence, the correct answer is option c.

---

7. Rishi visited Goa and made new friends. His new friends stay near the beach.
Parish lives 800 metres east of the beach.
Anil lives 1400 metres east of the beach.
Sunil's house is exactly between the houses of Parish and Anil.
What distance must Rishi travel if he visits the houses of Sunil and Parish, starting from the beach and returning to the beach?

a) 2500 m b) 3800 m c) 1900 m d) 2200 m

Answer: d

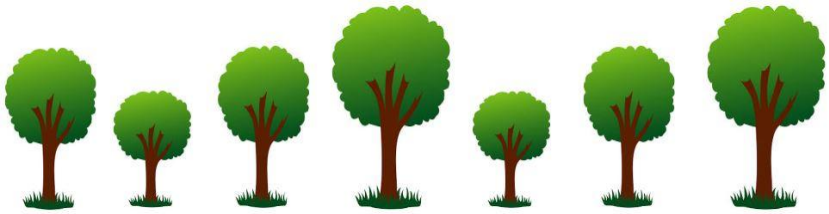
Solution:
Parish lives **800 m east** of the beach.
Anil lives **1400 m east** of the beach.
Sunil lives **exactly between** Parish and Anil.
So, the distance between Parish and Anil is:
1400 – 800 = 600 m
Half of this distance is:
600 ÷ 2 = 300 m
So, Sunil's house is **300 m east of Parish's house**.
Therefore, the distance of Sunil's house from the beach is:
800 + 300 = 1100 m
Now Rishi has to:

1. Start from the beach
2. Visit **Sunil's house** (1100 m away)
3. Visit **Parish's house** (which lies on the way back, since it is at 800 m)
4. Return to the beach

The farthest point he needs to travel to is **Sunil's house: 1100 m**.
So, total distance covered:
1100 m (going) + 1100 m (coming back) = 2200 m
Option d is correct.

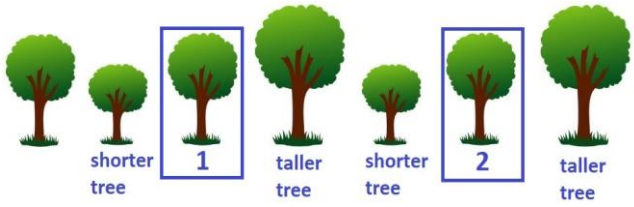
---

8. A group of trees with different heights is shown below. How many trees have both a taller and a shorter tree immediately next to them, compared to their own height?

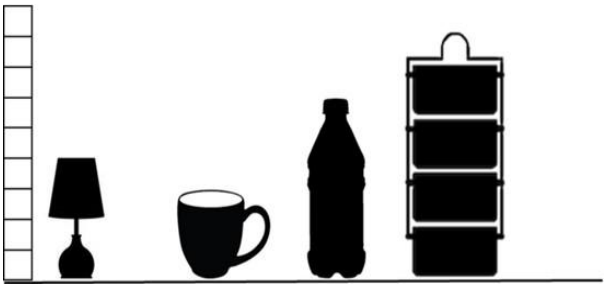


a) 1 b) 2 c) 3 d) 4

Answer: b
Solution:
The trees highlighted 1 and 2 have both a taller and a shorter tree immediately next to them. Hence, the correct answer is 2, option b.



9. **Statement: The lamp is __A__ unit(s) taller than the cup but 2 units shorter than the __B__. What will come in place of A and B, in the given statement?**

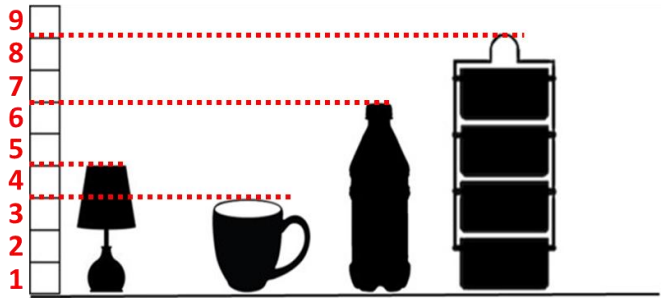


a) A - 2, B - lunch box
b) A - 1, B - bottle
c) A - 1, B - lunch box
d) A - 2, B - bottle

Answer: b

Solution:

The heights of the objects are as follows:



Lamp = 4 units, Cup = 3 units, Bottle = 6 units, Lunch Box = 8 units.

Therefore, the lamp is **1 unit** taller than the cup but 2 units shorter than the **bottle.**
Hence, the correct answer is option b.

---

10. **Mahesh knew that the distance between A and B was more than 3 km but less than 7 km. Ravi knew that the distance was more than 5 km but less than 10 km. If both of them are correct and the distance can only be an EXACT (integer) number of kilometres, how much must they pay if the taxi charges Rs. 8 per km?**

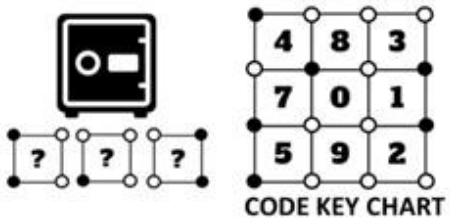
a) Rs. 48 b) Rs. 56 c) Rs. 40 d) Rs. 64

Answer: a

Solution:

Mahesh says the distance is **more than 3 km but less than 7 km**.
So, the possible integer distances are:
4 km, 5 km, 6 km.
Ravi says the distance is **more than 5 km but less than 10 km**.
So, the possible integer distances are:
6 km, 7 km, 8 km, 9 km.
To satisfy *both* of their statements, we take the **common distance** in both lists.
Common value = **6 km.**
Now, the taxi fare is **Rs. 8 per km**.
Total fare = 6 × 8 = Rs. 48. Hence, the correct answer is option a.

The locker has a secret code. Identify the code with the help of the given code key chart.



(a) 541 (b) 585 (c) 582 (d) 581

Answer: d

Solution:

The locker has a secret code made up of three digits, represented by blocks with a "?" symbol. We need to identify the corresponding numbers in the Code Key Chart by matching the patterns of dots on the blocks.

Step 1: Identifying the First Digit

• The first block has black dots on the left and white dots on the right

• Looking at the Code Key Chart, the matching box contains 5 (refer image 1)

• First digit = 5

Step 2: Identifying the Second Digit

• The second block has only a black dot in the bottom left corner

• In the Code Key Chart, the matching box contains 8 (refer image 2)

• Second digit = 8

Step 3: Identifying the Third Digit

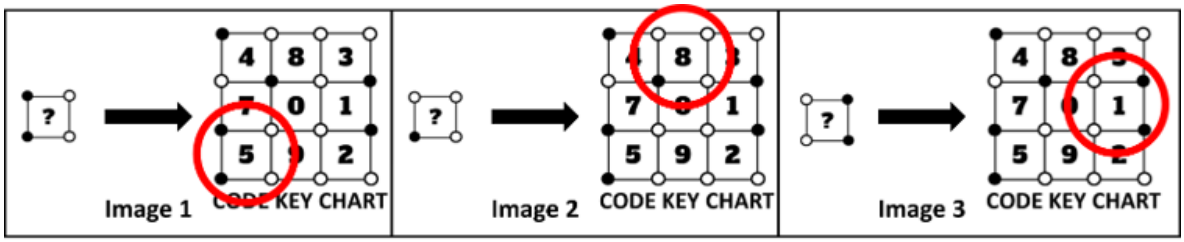
• The third block has black dots on the right and white dots on the left

• In the Code Key Chart, the matching box contains 1 (refer image 3)

• Third digit = 1

Thus, the secret locker code is 581.

Hence, the correct answer is option d.



Chapter 6: The Dairy Farm

1. **A mason laid 100 bricks in a row. He grouped bricks together, where every group has 25 bricks. If 8 bricks from each group are removed, then how many bricks are left in total?**

   a) 32 b) 64 c) 68 d) 92

   Answer: c

   Solution:

   Divide the bricks into groups:

   The total number of bricks is 100. He divides them into groups of 25 bricks each.

   So, the number of groups formed is:

   100 ÷ 25 = 4 groups

   Remove bricks from each group:

   From each group, 8 bricks are removed.

   Total bricks removed:

   8 × 4 = 32 bricks

   Calculate the remaining bricks:

   100 − 32 = 68 bricks left

   Hence, option c is the correct answer.

---

2. **Two types of boxes, A and B, are being transported. Each carton can hold either 8 boxes of type A or 10 boxes of type B. If a total of 76 boxes were transported, what is the minimum number of cartons required, given that all the cartons are full?**

   a) 6 b) 7 c) 8 d) 9

   Answer: c

   Solution:

   Let's solve it logically.

   The question asks for the minimum number of cartons required.

   To keep the count as low as possible, we have to fill in the cartons with more boxes.

   The carton can hold 10 boxes of type B.

   As the total number of boxes is 76, the maximum number of type B boxes that can be transported is 70. (7 cartons x 10)

   This leaves 6 boxes behind, but the next carton cannot be filled completely (as a carton can either hold 8 or 10 boxes).

   So, let's decrease the number of type B boxes to 60 (6 cartons x 10).

   Now, 76 – 60 = 16 boxes will be left.

   Now, we can accommodate 16 boxes in two cartons (8 in each).

   This makes the total count 8 (6 cartons with 10 boxes each and 2 cartons with 8 boxes each)

   Hence, the minimum number of cartons that can transport 76 boxes = 8.

   Thus, the correct answer is option c.

3. **8 teams are divided into two pools of 4 teams. The teams within a pool play with every other team in the pool twice. After these matches, the top team from each pool is selected and they play a final to decide the winner. How many matches will be played in total?**

a) 24 b) 25 c) 28 d) 29

Answer: b

Solution:

There are 8 teams divided into 2 pools of 4 teams each.
In one pool of 4 teams, each team plays with every other team, twice.
Let A, B, C, and D be the 4 teams in one pool.
6 different pairs can be made: AB, AC, AD, BC, BD, CD.
Since each team plays with every other team twice, that makes 12 matches in one pool.
With 2 pools, the total becomes 12 + 12 = 24 matches.
Then the top team from each pool plays 1 final match.
So, 24 + 1 = 25 matches in total.
Option b is the correct answer.

---

4. **Raj took an entrance exam where he attempted 38 questions out of 40, out of which he got 3 questions wrong. If the marking scheme per question is shown below, what is the maximum marks Raj could score?**

Section A (25 Questions)	**Section B** (15 Questions)
Correct Answer : +2	Correct Answer : +3
Wrong Answer : -2	Wrong Answer : -2
Un-attempted : 0	Un-attempted : -1

a) 76 b) 79 c) 81 d) 83

Answer: b

Solution:

Let's solve this question using a logical approach.
Raj attempted 38 questions out of 40 and he got 3 questions wrong.
So, we can say that he did not attempt 2 questions.
As per the table, section A grants 0 and section B grants -1 for each un-attempted question.
To maximize Raj's score, we'll have to assume that Raj's un-attempted questions are from section A.
The maximum marks that Raj can score from section B is 15 x 3 = 45 (assuming that all questions of this section are answered correctly).
Now, among the 38 questions that he had answered, 15 are from section B.
So, the remaining 23 questions are from section A.
Also, we know that he got 3 questions wrong.
So, his status in section A would be 20 correct answers + 3 wrong answers.
Score of section A = (20 x 2) - 3(2) = 40 - 6 = 34.
Adding the scores of section A and section B, the total score is 45 + 34 = 79.
Hence, the maximum possible score would be 79. Thus, the correct answer is option b.

5. **80 kg of material needs to be transported to a place that is 10 km away.**
The material must be divided into only one fixed load size for the entire transport. The possible load sizes are 10 kg, 20 kg, or 40 kg. Any number of couriers may be used.
Each courier:
- **Charges ₹10 per hour**
- **Travels at 10 km/hr when empty**
- **Travels at 5 km/hr while carrying 10 kg**
- **Travels at 2 km/hr while carrying 20 kg**
- **Travels at 1 km/hr while carrying 40 kg**

A courier can carry at most 40 kg at a time.
After delivering a load, the courier must return empty before the next trip. Even after the final delivery, the courier returns empty, and all return journeys are charged.
What is the minimum total cost required to transport all 80 kg of material?

a) Rs. 220 b) Rs. 240 c) Rs. 260 d) Rs. 280

Answer: a

Solution:

We must move 80 kg over 10 km, and we can choose only one load size: 10 kg, 20 kg, or 40 kg.
Couriers charge ₹10 per hour and must return empty every time (even after the last trip), so every delivery includes a go trip (loaded) and a return trip (empty).
Case 1: If we choose 40 kg per trip, we need 2 deliveries (80 ÷ 40).
- Going with 40 kg: speed = 1 km/hr i.e. 10 km takes 10 hours
- Returning empty: speed = 10 km/hr i.e. 10 km takes 1 hour
  So, one round trip takes 11 hours.
  For 2 round trips: 11 × 2 = 22 hours
  Cost = 22 × ₹10 = ₹220

Case 2: If we choose 20 kg per trip, we need 4 deliveries.
- Going with 20 kg: speed = 2 km/hr i.e. 10 km takes 5 hours
- Returning empty: 1 hour
  One round trip = 6 hours
  For 4 round trips: 6 × 4 = 24 hours
  Cost = 24 × ₹10 = ₹240

Case 3: If we choose 10 kg per trip, we need 8 deliveries.
- Going with 10 kg: speed = 5 km/hr i.e. 10 km takes 2 hours
- Returning empty: 1 hour
  One round trip = 3 hours
  For 8 trips: 3 × 8 = 24 hours
  Cost = 24 × ₹10 = ₹240

Comparing all options, the lowest cost is ₹220 when carrying 40 kg per trip.
Therefore, option a is the minimum possible and the correct answer.

---

6. **In a theatre, seats are arranged in rows labelled A to F and columns labelled 1 to 5. If the entire row C and the entire columns 3 and 5 are empty and the rest of the seats are sold out, then how many tickets are sold out in total?**

a) 13 b) 17 c) 15 d) 14

Answer: c

Solution:

The theatre has 6 rows with 5 seats and 5 columns with 6 seats. Therefore, the total number of seats in the theatre is 6 x 5 = 30.

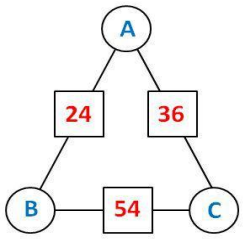
As Row C is empty, and since 1 row has 5 seats, we deduct 5 seats from the total, resulting in 30 - 5 = 25 seats.
Additionally, columns 3 and 5 are empty, and considering 1 column has 6 seats, we deduct 12 seats. However, only 10 seats will be deducted, as 2 seats were already accounted for while deducting seats for Row C (since 1 seat is always common between a row and a column).
After deducting 10 seats from the remaining 25 seats (25 – 10 = 15), the total number of tickets sold is 15. Hence, the correct answer is option c.

ALTERNATE APPROACH
One row and two columns are completely empty, while five rows and three columns are filled with seats. To determine the number of tickets sold or seats occupied, multiply the number of occupied rows by the number of occupied columns. This calculation results in 5 rows × 3 columns = 15 occupied seats.

	1	2	3	4	5
A	1	6	x	11	x
B	2	7	x	12	x
C	x	x	x	x	x
D	3	8	x	13	x
E	4	9	x	14	x
F	5	10	x	15	x

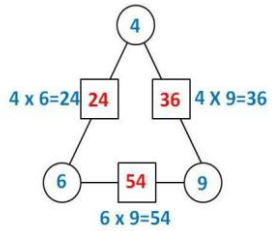
---

7. If the number in each square is the product of the two numbers in the circles connected to it, what is the value of B?



a) 9
b) 6
c) 4
d) Cannot be determined

Answer: b
Solution:
It is mentioned in the question that the number in each square is the product of the two numbers in the circles connected to it.
As can be seen in the image below,
A × B = 24, A × C = 36, and B × C = 54
So,
B must be a common factor of 24 and 54.
Common factors of 24 and 54 are 1, 2, 3, 6.
Check which value fits all conditions.
If B = 6, then A × 6 = 24, so A = 4
and 6 × C = 54, so C = 9.
Now verify: A × C = 4 × 9 = 36, which matches the given number.
Thus, B = 6.
Hence, the correct answer is option b.



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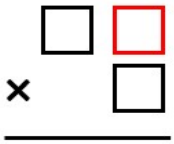
8. If we place the numbers 5, 6, and 7 in the boxes shown below and the product is 455, which number will go in the red box?



a) 5
b) 6
c) 7
d) Either option a or option c

Answer: a

Solution:

We want the product of the two numbers to be **455**.

We are placing **5, 6, and 7** in the three, empty boxes:

Step 1: Look at the units digit

- The units digit of **455** is **5**
- A multiplication ends in **5 only when one number ends in 5 and the other number is odd**

So, **yes**, there are two ways the "5" can appear in the units place:

1. **Top number ends in 5**
2. **Bottom number is 5**

So, we need to check both.

Case 1: RED box = 5

Then the top number looks like:

_ 5
× _
_____

Now try the remaining digits **6** and **7**:

- Try **65 × 7 = 455** i.e. **Correct!**
- Try **75 × 6 = 450** i.e. Not 455

So, **one valid result exists** here.

Case 2: Bottom number = 5

Then the multiplication becomes:

_ _
× 5
_____

Check all possible two-digit numbers formed by **6 and 7**:

- **67 × 5 = 335**
- **76 × 5 = 380**

Neither equals **455**.

So, **this case is not possible**.

Conclusion:

Even though the 5 could be in the bottom number in theory, **it does NOT produce 455** with the remaining digits.

The **only** way to get 455 is:

```
 6 5
×  7
-----
 455
```

So, the **red box must contain 5**. Hence, the correct answer is option a.

---

9. In a classroom, there are 5 desks in each row. The number of rows is not known. First, all the desks in the front row are removed. Then, one desk is added to the leftmost side of each remaining row. After these changes, the total number of desks in the classroom becomes one of the following: 18, 20, 22, or 28.
Which of these could represent the number of rows remaining after the front row was removed at the start?

a) 3 b) 4 c) 5 d) 7

Answer: a

Solution:

Each row has 5 desks initially.

Now, a desk is added on the leftmost side of each row, so all the rows will now have 6 desks and hence the number of desks will be the product of 6 and some number.

Among the given numbers (18, 20, 22, and 28), only 18 is a multiple of 6 and hence the number of desks present now are 18.

Since each row has 6 desks, the number of rows will be 18/6 = 3.

Hence, the correct answer is option a.

---

10. The numbers in Row C have been changed to the numbers in Row D by using a specific rule. Which of the following options shows that rule?

ROW C	30	60	10	90	150
ROW D	240	480	80	720	1200

a) 8 × C = D
b) 8 × D = C
c) C + 210 = D
d) Both a and c are correct

Answer: a

Solution:

Let us check each option one by one to find the correct rule that converts Row C into Row D.

Option a: 8 × C = D

30 × 8 = 240, 60 × 8 = 480, 10 × 8 = 80, 90 × 8 = 720, and 150 × 8 = 1200.

All the values match Row D, so this rule works correctly.

Option b: 8 × D = C

240 × 8 = 1920, which does not match 30.

So, this rule is incorrect.

Option c: C + 210 = D

30 + 210 = 240 (matches)

60 + 210 = 270, which does not match 480.

So, this rule does not work for all numbers.

Option d: Both a and c are correct

Since option c is incorrect, this option is also incorrect.

Hence, option a is the correct answer.

Given below are 6 boxes, A, B, C, D, E, and F, each having a pair of shapes. They need to be categorised into 4 groups, as follows:
- If both shapes in a box are of the same colour, they belong to Group 1. If not, they belong to Group 2
- If both shapes in a box are the same (irrespective of their colour), they belong to Group 3. If not, they belong to Group 4
- One box can be part of more than one group
How many boxes belong to BOTH groups 2 and 4?

(a) 3 (b) 4 (c) 2 (d) 1

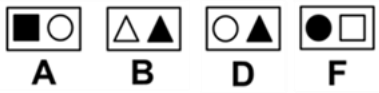
Answer: A

Solution:

The following boxes should be categorised into four groups and the same box can belong to more than one group.

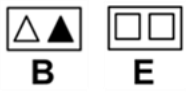
If both shapes in a box are of the same colour, they belong to Group 1. If not, they belong to Group 2. Accordingly, only C and E belong to group 1 as they have shapes of same colour, while the rest belong to group 2.

GROUP 1

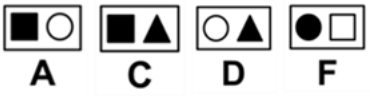


GROUP 2

If both shapes in box are same (irrespective of their colour), they belong to Group 3. If not, they belong to Group 4. Accordingly, B and E belong to group 3, as they have same shapes, while the rest belong to group 4.



GROUP 3



GROUP 4

Clearly, three boxes A, D, and F belong to both groups 2 and 4.

Hence, option a is the correct answer.

Chapter 7: Shapes and Patterns

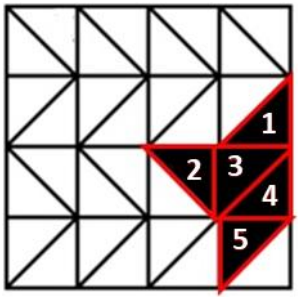
1. **On a wall, there are some triangular tiles with equal sides, of which some have been removed, leaving a black coloured wall. How many such triangular tiles have been removed?**

a) 4 b) 5 c) 6 d) 7

Answer: b

Solution:

As highlighted in the image below, 5 tiles have been removed. Hence, the correct answer is option b.



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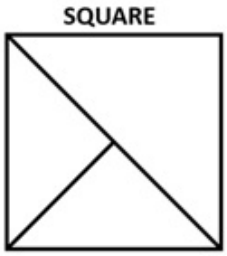
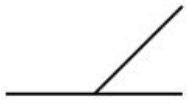
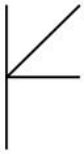
2. **Which of the following additional lines, shown in the options, should be drawn so that the square given in the question image is divided into 8 EQUAL parts?**
Note: *You cannot rotate the question or option images*



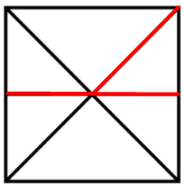
a)  b)  c)  d) 

Answer: d

Solution:

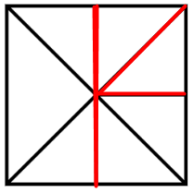
Let's check each option

Option a:



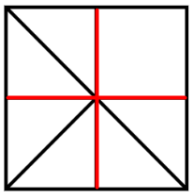
Option a does not show the square divided in 8 equal parts.

Option b:



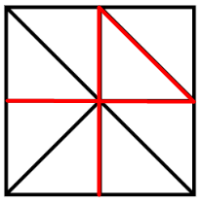
Option b does not show the square divided in 8 equal parts.

Option c:



Option c does not show the square divided in 8 equal parts.

Option d:



Option d divides the square in 8 equal parts.

Hence, option d is correct.

---

3. Sam divided a rectangle into 6 equal parts using lines such that each line further divided the rectangle into more parts. Which of the below options could represent the number of lines used by Sam?

a) The rectangle is divided using 3 horizontal and 3 vertical lines

b) The rectangle is divided using 3 horizontal and 2 vertical lines

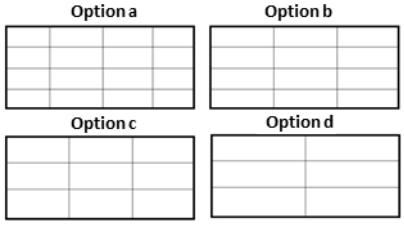
c) The rectangle is divided using 2 horizontal and 2 vertical lines

d) The rectangle is divided using 2 horizontal and 1 vertical line

Answer: d

Solution:

As shown in the image below, the rectangle divided by 2 horizontal and 1 vertical line will give 6 equal parts. Hence, option d is the correct answer.



4. **A paper piece is in the form of a regular pentagon. At most how many times can it be folded in half? Note:** *Once the paper is folded, it cannot be unfolded*

a) 0 b) 1 c) 2 d) 3

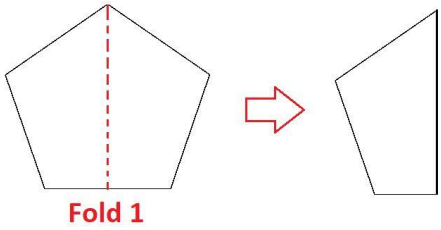
Answer: b

Solution:

A regular pentagon can be folded in half only along a line of symmetry. One such fold is possible.

After the first fold, the new shape cannot be divided into two equal halves. Since the paper cannot be unfolded, no further fold in half is possible.

Therefore, the paper can be folded in half at most once. Hence, the correct answer is option b.



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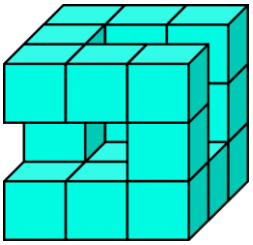
5. **Given below is an incomplete arrangement of a 3 x 3 x 3 cube where all the smallest cubes are of the same size. How many such smallest cubes are required to complete the cube?**



a) 4 b) 5 c) 6 d) 7

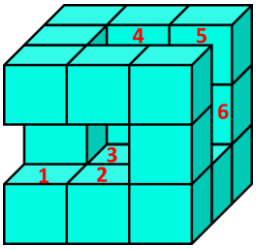
Answer: c

Solution:

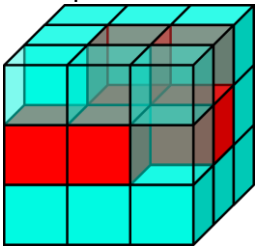
Let's see which cubes have been removed by looking at the given arrangement.

We can see that the cubes above 1, 2, and 3 are missing.

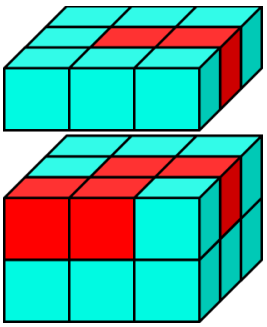
Also, the cubes in front of 4, 5, and 6 are missing.



Let's place red cubes in the empty spaces next to 1, 2, 3, 4, 5, and 6.



As we can see, there are 6 small cubes that were missing from the given arrangement.



Thus, the correct answer is option c.

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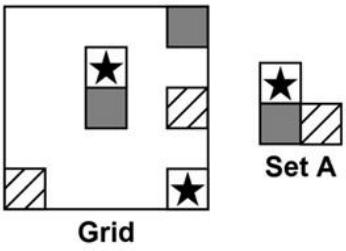
6. In how many different ways can Set A (without rotating) be placed completely on the grid so that no two squares overlap and no two adjacent squares have the same pattern?
Note: *Squares that share common sides are considered to be adjacent. Squares that share a common corner alone, are NOT adjacent*



a) 4 b) 5 c) 6 d) 7

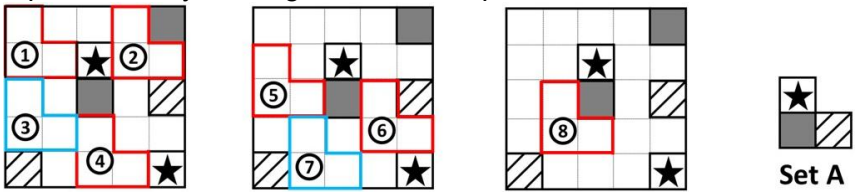
Answer: c

Solution:

First, we mark all the positions on the grid where the L-shape from Set A can fit without going outside the boundary.

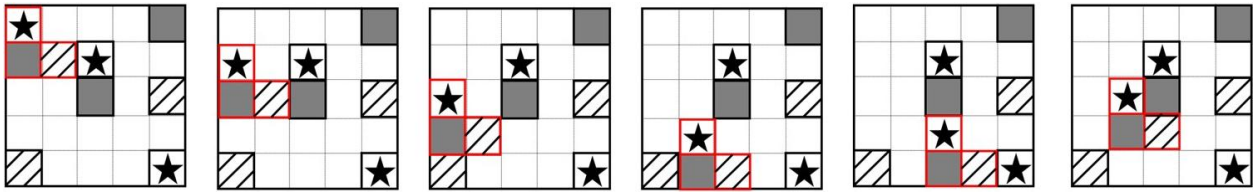
Next, we remove the positions where Set A cannot be placed because one of its patterned squares would be adjacent to a square on the grid that has the same pattern.

For example, at positions 2 and 6, the striped square of Set A becomes adjacent to another striped square already in the grid. So, these placements are not allowed.



Now, we check the remaining positions.

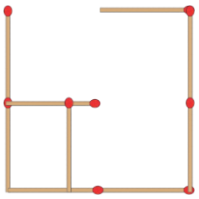
In these positions, the L-shape fits completely, and none of its squares is adjacent to another square with the same pattern.



Finally, after testing all the valid positions, we see that Set A can be placed in 6 different ways.

Hence, option c is the correct answer.

7. **What is the minimum number of matchsticks needed to make a figure which is divided into 6 equal parts?**
Note: *You can't change the placement of the matchsticks already in the image*



a) 4 b) 5 c) 6 d) 7

Answer: b

Solution:

We cannot change the position of the matchsticks already given in the figure. We need to add the minimum number of matchsticks so that the figure is divided into 6 equal parts.

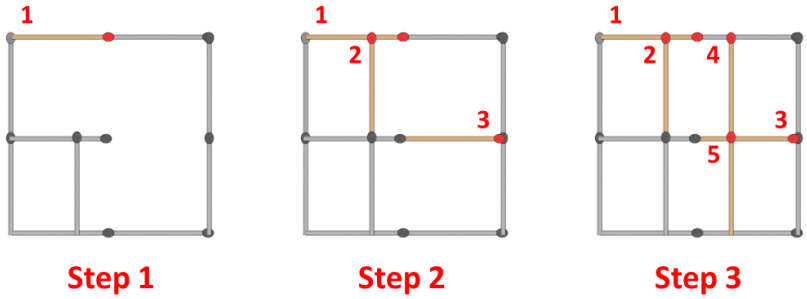
Step 1: First, complete the outer square by adding matchstick 1 at the top side.

Step 2: Next, complete the inner structure of the figure by adding matchstick 2 vertically from the top to the middle point and matchstick 3 horizontally on the right side.

Step 3: Now the figure is almost divided into equal sections. Since the figure must be divided into 6 equal parts, add two more matchsticks: matchstick 4 and matchstick 5 vertically to complete the divisions.

As shown in the solution, 5 matchsticks are required to form a square, which is divided into 6 equal parts.

Hence, the correct answer is option b.



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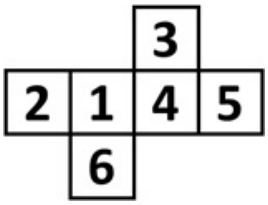
8. **Given below is the net of an unfolded cube. Which of the following pairs of numbers would be on the opposite faces of the cube when the net is folded?**



a) 6 and 4 b) 1 and 3 c) 5 and 6 d) 1 and 5

Answer: d

Solution:

Let's use the given information step by step.

• Starting with 1 as the top face, the numbers 4 and 2 are adjacent to 1. Upon folding, they become opposite to each other, with 2 on the left face and 4 on the right face, while 1 remains on the top face (as shown in Figure 1).

• After the first fold, 3 and 6 will become opposite to each other, resulting in 3 being on the back face and 6 on the front face (as shown in Figure 2).

• The last remaining number, 5, naturally occupies the bottom face of the cube and is opposite to 1 (as shown in Figure 3).

Among the given options, the only option that gives the numbers that end up being opposite after the folding process is option d) 1 and 5
Hence, the correct answer is option d.

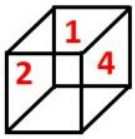


Figure 1

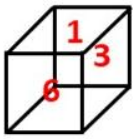


Figure 2

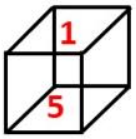


Figure 3

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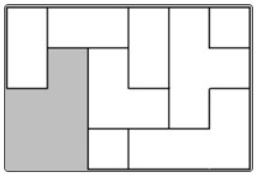
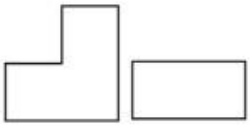
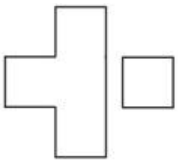
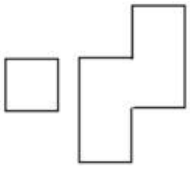
9. Which of the following set of pieces CANNOT be arranged in the grey space to complete the rectangle?
Note: *You cannot rotate or overlap the given pieces*



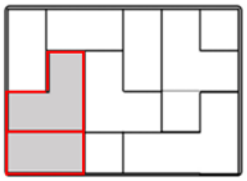
a) 

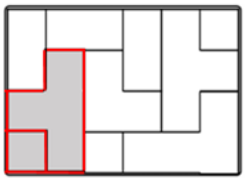
b) 

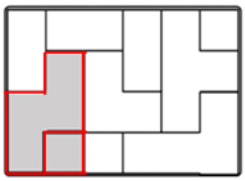
c) 

d) 

Answer: c
Solution:
The approach to solving this question is to first consider the empty space shown in the question image. For each option, start by taking the larger piece of the two and check if it can fit within the blank area in the question image.
Once the larger piece is placed, check if the remaining space is sufficient to accommodate the smaller piece, ensuring that both pieces together will fully cover the empty area.
Repeat this process for all the given options.


Option a


Option b


Option d

Only the set of pieces given in option c cannot be arranged in the grey space. Thus, option c is the correct answer.

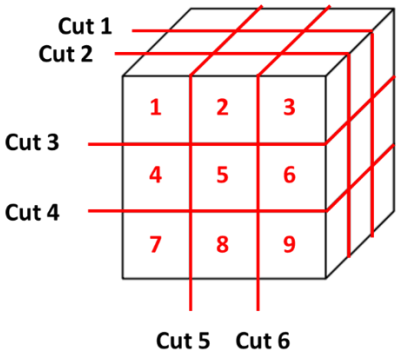
---

10. Two faces of a plain white cube are painted red. Now the cube is divided into 27 small cubes of equal dimensions. How many such smaller cubes will have at least one face painted?

a) 6
b) 12
c) 15
d) Cannot be determined

Answer: d
Solution:
The cube is divided into 27 smaller cubes, which means it is cut into 3 parts along each edge (3 × 3 × 3), as shown in the image given below. Thus, each face of the cube will be divided into 9 smaller squares,

and each face of the cube will have 9 smaller cubes on that face.



However, if the coloured faces are adjacent, there would be three cubes which would have two faces coloured.
Thus, the number of smaller cubes with at least one face coloured will be 15.
However, if the coloured faces are opposite, there would be 18 such smaller cubes with at least one coloured face. Hence, the exact number cannot be determined. Thus, the correct answer is option d.

A, B, C, D, E, and F are 6 friends.
A, C, and F are girls, while the others are boys.
C and E are playing chess, while the others are playing Ludo.
How many boys are playing Ludo?

(a) 1 (b) 2 (c) 3 (d) 4

Answer: b

Solution:

The correct approach to solve the given question is to organize all the information in a table.

From the given information, we know that A, C, and F are girls.

	A	B	C	D	E	F
Gender	Girl		Girl			Girl

That means **B, D, and E** are boys.

	A	B	C	D	E	F
Gender	Girl	Boy	Girl	Boy	Boy	Girl

It is given that C and E are playing chess and others are playing Ludo.

	A	B	C	D	E	F
Gender	Girl	Boy	Girl	Boy	Boy	Girl
Game	Ludo	Ludo	Chess	Ludo	Chess	Ludo

So, the boys who are playing Ludo are B and D.

	A	B	C	D	E	F
Gender	Girl	Boy	Girl	Boy	Boy	Girl
Game	Ludo	Ludo	Chess	Ludo	Chess	Ludo

Hence, the answer is option b.

Chapter 8: Weight and Capacity

Activity Time

Measuring Weight

Introduction

In this activity, we can use the understanding of a weighing scale to search for a particular weight. This can be done in many ways, and some of these methods will be faster than others. This is similar to how a computer also searches. In this activity, we will explore search algorithms using a weighing balance and see how we can speed up the process using different approaches. We will separate a lighter fake weight from 8 proper weights among 9 identical-looking weights. We convey to students that the same reasoning can be applied to the analysis of computer algorithms.

Activity	Time	Description
Launch	5 min	The teacher poses the question to the students and invite couple of students to try their ideas. Activity Video Link: Computational Thinking with तराज़ू (Weighing Scale) | 15th August | Ep 6 - 3030 Eklavya
Problem-solving and algorithm	25 mins	Student's Tryout the activity with each other. Student Worksheet: Khotta Baant aur Tarazoo| CT CBSE | Student As the teacher progresses through the activities, the students progress along with the worksheet.
Discussions and Explorations	5 min	The discussion on the various algorithms, how a slight change in approach leads to a faster solution, and how computers apply such algorithms

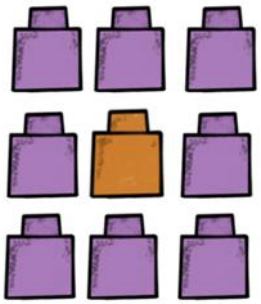
CT Components

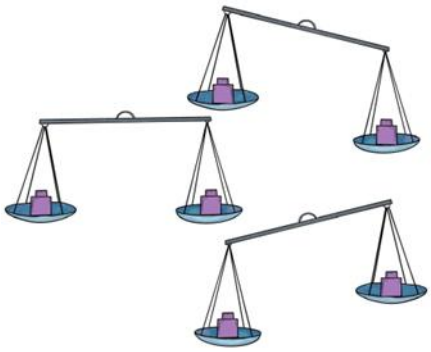
This activity develops in a way that helps students discover important ideas, such as breaking a problem into smaller problems (decomposition), identifying patterns, developing algorithms, and finding faster ways to complete a task, thus analysing algorithms. These are fundamental ideas involved in computational thinking.

Activity: Searching with a Weighing Scale

Imagine we have **9 identical-looking weights** out, of which one is **Lighter, a fake weight**. We have to figure out which one is lighter using only a weighing scale (and nothing else).

Our goal is to find the fake in the least number of weighings.





How will we figure this out? What process will we use to determine the fewest weighings needed to identify the lighter fake weight? Always assume that you have the worst luck and will get the fake weight in the last possible step.

Make the students observe these things:

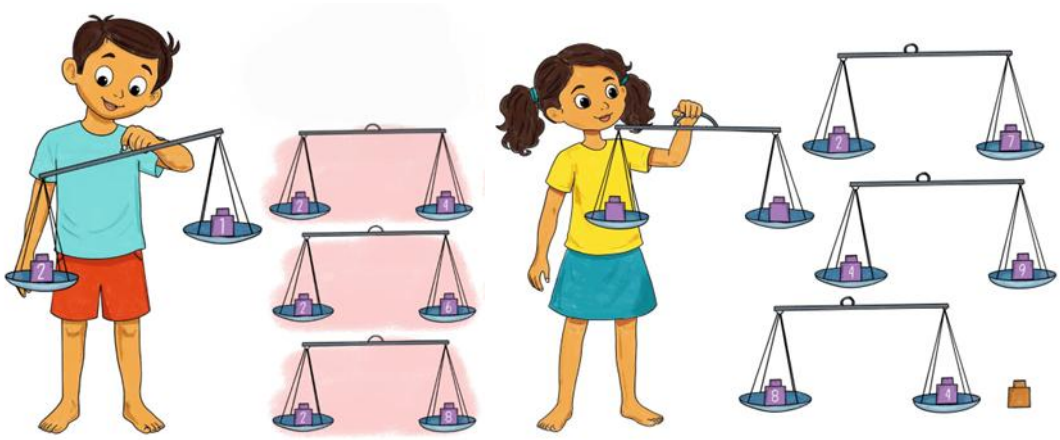
- A 2-pan weighing balance can be in 3 positions during weighing. Either the left or the right side could be heavier, or both sides could be balanced.
- We weigh two weights, one on either side, and the weighing balance shows that they are equal. From this, we can conclude that. The fake weight is in the remaining weights.
  We know that there is only one fake weight that is lighter than the rest. This means all the other weights weigh the same. So, if the weighing scale is balanced, the weights are not fake. This implies that the lighter weight is in the rest of them.
- By observing how many weights can be discarded after each weighing, we can determine which method is faster. The method that helps us remove more weight per round is faster than the rest of the methods

A: Initial attempt

Let's take **two weights** at a time and compare. Taking two weights at a time can be done in two different ways:

- In the first method, we keep the weight on **one side constant** (let's say the right) and choose **a new weight** for the left side at each weighing.
- Second method, we chose **two new weights** for every weighing.

Demonstrate both methods partially to the students. Do not completely show the students the methods. Or you can invite a couple of students whose answers seem like a good method to come and do it in front of the class.



1. **Is one of the methods above faster (fewer weighings) than the other, and if yes which one?**
   a) Yes, method one is faster
   b) Yes, method two is faster
   c) No, both take the same number of weighings

   Answer: B

   Solution: In method one, we can remove only one weight per weighing, whereas in the second method, we can remove two weights. Removing more weights in each weighing means fewer weights to compare in future rounds.

   Competency: Analysis, observations, deduction

   Demonstrate both methods to the students so that they can verify their answers.

---

2. **How many minimum weighings will it take to guarantee figuring out the fake (lighter) weight when you compare two weights at a time?**

   (This means we are assuming you always have bad luck and get the fake one in the last possible step)

   a) 5 weighings b) 8 weighings c) 4 weighings d) 7 weighings

   Answer: c

   Solution:

   We compare two weights; if they are equal, we know neither is fake, so we remove both. Similarly, we have to compare two more pairs. Now, in the fourth attempt, we have 3 weights remaining. If the two chosen weights are unequal, then the lighter one is the one we have found; if they are equal, the remaining weight is the lighter one. This type of strategy is called Divide and Conquer.

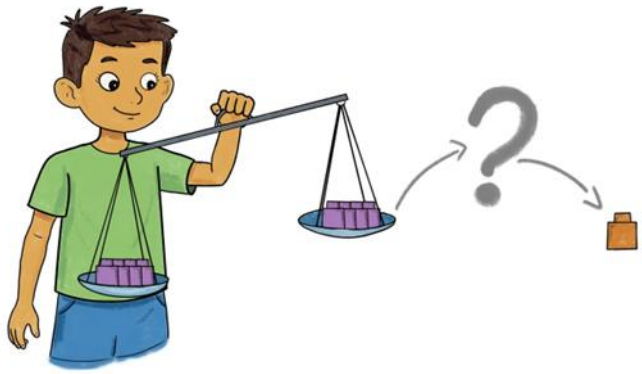
   Competency: Pattern recognition, logic

   For the first method suggested above, you have to compare one fixed weight with the remaining 8 weights to find the one that differs in weight. Using this method, we can figure out the lighter weight in 7 weighings (Why not 8?). This is a Linear search.

   Key observations after the above activity:

   - If weights are equal when weighed, then they are both not the fake weight (Why?)
   - We can remove a maximum of 2 weights in each round
   - We need to remove the maximum possible weights in each round, and divide-and-conquer is more efficient than linear/sequential search.
   - If we have 3 weights remaining, and compare any two. Then, if the two chosen weights are unequal, then the lighter one is the fake; if they are equal, the remaining weight is the fake weight.

   B: A faster way (Binary search)



To do it faster, we need to remove as many weights as possible in each round and use divide-and-conquer better. We can divide the 9 weights into 2 equal parts of 4 each, leaving 1 weight.
In the first weighing, we keep 4 on the left and 4 on the right, and the remaining is set aside.

1. **After one weighing, how many weights remain?**
   a) 1 b) 4 c) 5 d) 8
   Answer: b
   Solution:
   When we compare 4 weights with 4 other weights, the weighing scale is either balanced or not balanced. In the worst-case situation, they are not balanced. This means the lighter side will be above the other 4. So, we can remove the 4 weights on the heavier side, and we can also remove the one we didn't weigh, since it's not a fake weight either. 5 proper weights get removed from the search space.

   Competency: Algorithmic thinking, decomposition, generalization

---

2. **If the fake is among the 4 remaining weights, how many more weighings are needed (minimum) to find the fake weight?**
   a) 1 b) 2 c) 3 d) 4
   Answer: b
   Solution:
   We divide the 4 weights into 2 groups of 2 and compare them. One side will be lighter than the other; it will have the fake weight. So, we have 2 weights left. We further split these two weights, compare them, and then find the fake weight.

   Competency: algorithmic thinking, analysis, decomposition
   We figured out the fake weight in 3 weighings. This method of dividing a problem into two parts and then finding a solution is known as Binary search.
   Can we find the fake weight in fewer weighings than this?

C: Fastest possible algorithm in a three-state system

Can we do this faster than the binary search? Let's bring together the various points we observed above. We saw that the weighing balance is a three-state system. We also saw that we can infer information about a weight without actually weighing it. We also saw that with three weights, we can infer which one is the fake in a single weighing.

Let's try dividing into 3 equal parts, and now we will weigh two groups of three.

1. **How many weights get removed after the first weighing?**

   a) 2 b) 4 c) 3 d) 6

   Answer: d

   Solution:

   When we compare the two groups of 3 weights, they will be either balanced or not balanced. If the weighing scale is balanced, then the 6 weights on the balance are not fake. Otherwise, one of the sides with the three weights is lighter, which implies that the 3 on the heavier side and the three not on the balance are not fake. Either way, we remove 6 weights.

   Competency: algorithmic thinking, analysis, decomposition, pattern recognition

---

2. **How many steps does this method require to determine the fake weight?**

   a) 1 b) 2 c) 3 d) 4

   Answer: b

   Solution:

   In the first weighing, we removed two-thirds of the 9 weights; 3 weights remain. Similarly, we remove 2 of the 3 weights in the second weighing and thus identify the fake weight in 2 weighings (refer to the observations made after the first step and the explanation for the previous question).

   Competency: algorithmic thinking, analysis, decomposition, observation, pattern recognition

   We see that if we have three equal groups, we can find the lightest group in one step. If these groups each have three weights, then in the second weighing, we get the lightest weight.

   Conclusion

   We see that dividing the search space into three parts is faster for finding the fake weight using a balance. This happens because in a three-state system, “ternary search” is a faster searching algorithm.

   We broke the problem into 3-weight chunks, understood the pattern, saw how it gets solved, and used the same algorithm to solve the bigger 9-weight problem.

Questions

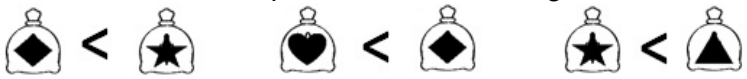
1. **Which object would be the 3rd heaviest if you arrange the following objects in decreasing order of their weights?**

a)  b)  c)  d) 

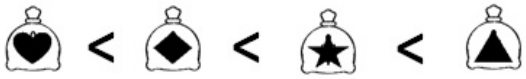
Answer: b

Solution:

Based on the scales provided, the following observations can be made:



From this, we can conclude that:



Hence,  is the 3rd heaviest. Thus, the correct answer is option b.

---

2. **Amit, Devashish, and Ajay are weighing themselves on a FAULTY weighing machine. This machine always shows weight more than the actual weight by some constant amount in kg. This machine shows Devashish's weight as 78 kg. Amit's weight is 6 kg less than Devashish's weight, and the actual weight of Amit is 65 kg. What will be Ajay's weight shown by this machine if Ajay's actual weight is 56 kg?**

a) 65 kg b) 63 kg c) 60 kg d) 49 kg

Answer: b

Solution:

Devashish's weight which is shown by machine = 78 kg

Amit's weight which is shown by machine = 78 - 6 = 72 kg

Amit's actual weight = 65 kg

It means the machine shows the weight increased by 7 kg.

Thus, if Ajay's actual weight is 56 kg, the machine will show 56 + 7 = 63 kg.

Hence, the correct answer is option b.

---

3. **John weighs 2 kg more than Bob. Sam weighs 1 kg less than John. What is the difference between the weights of Sam and Bob?**

a) 1 kg b) 2 kg c) 3 kg d) 4 kg

Answer: a

Solution:

John weighs 2 kg more than Bob.

So, John = Bob + 2 ---(1)

Sam weighs 1 kg less than John

So, Sam = John – 1 ---(2)
= Bob + 2 – 1 (As John = Bob + 2, from (1))
= Bob + 1
So, Sam weighs 1 kg more than Bob. Option a is the correct answer.

---

4. Which of the following statements is/are sufficient to answer the following question?

QUESTION: What will be the total weight of 10 tiles, if each of them weighs the same?

STATEMENT 1: One-fifth of the weight of all the tiles together is at least 10 kg more than the weight of each tile.

STATEMENT 2: The total weight of three tiles is 10 kg more than the total weight of two tiles.

a) Statement 1 alone is sufficient
b) Statement 2 alone is sufficient
c) Both Statement 1 and Statement 2 are necessarily required
d) Question cannot be answered even if both Statement 1 and Statement 2 are taken

Answer: b

Solution:

From statement 1:

Statement 1 says that **one-fifth of the total weight of all 10 tiles is at least 10 kg more than the weight of one tile**.

This only tells us that the weight of one tile must be **more than a certain minimum value**. (here, 10 kg) However, the exact weight of one tile is not known. It could be slightly more than that minimum or much more.

Since the exact weight is unknown, the total weight of 10 tiles **cannot be uniquely determined** using this statement alone.

So, **Statement 1 is not sufficient**.

From statement 2:

Statement 2 says that **three tiles together weigh exactly 10 kg more than two tiles**.

This clearly means that the **extra tile alone weighs 10 kg**.

So, the weight of one tile is exactly **10 kg**.

Once we know the weight of one tile, we can directly find the total weight of 10 tiles.

Therefore, **Statement 2 alone is sufficient** to answer the question.

Hence, the correct answer is option b.

---

5. The sum of the weights of A and B is 50 kg, while the sum of the weights of B and C is 70 kg. If the weight of A is greater than or equal to 20 kg, which of the following CANNOT be the weight of C?

a) 30 kg b) 40 kg c) 50 kg d) 60 kg

Answer: a

Solution:

If A is at its minimum weight (20 kg), then B's weight would be 30 kg (50 kg - 20 kg = 30 kg). In this case, C's weight would be 70 kg - 30 kg = 40 kg.

If A is at its maximum weight (50 kg), then B's weight would be 0 kg (50 kg - 50 kg = 0 kg). In this case, C's weight would be 70 kg - 0 kg = 70 kg.

So, the possible weight range for C is between 40 kg and 70 kg.

Thus, the value of C cannot be 30 kg. Hence, the correct answer is option a.

6. **A total of 15 litres of water is completely emptied into five different buckets.**
Three of the five buckets have capacities of 3 litres, 6 litres, and 2 litres.
If all five buckets are filled such that 1 litre of space remains unfilled in each bucket, find the capacities of the remaining two buckets.

a) 2 litres and 3 litres b) 4 litres and 5 litres c) 3 litres and 4 litres d) 5 litres and 6 litres

Answer: b

Solution:

We know that every bucket is filled **leaving 1 litre empty**.

The 3 given buckets will hold:

- **3-litre bucket - 2 litres of water**
- **6-litre bucket - 5 litres of water**
- **2-litre bucket - 1 litre of water**

Total water filled in these 3 buckets =

2 + 5 + 1 = 8 litres

Total water = **15 litres**

Water still left = **15 – 8 = 7 litres**

Now, we must use **2 more buckets** to hold this **7 litres**, but remember:

Each of the remaining buckets must also leave 1 litre empty.

Since **1 litre must be left empty in each bucket**, the total capacity of the two buckets must be 7 + 2 = 9 litres.

We need two bucket sizes whose **total capacity adds up to 9**.

Try the options:

(a) **2 & 3 litre buckets**

Total capacity = **2 + 3 = 5 litres**

(b) **4 & 5 litre buckets**

Total capacity = **4 + 5 = 9 litres**

(c) **3 & 4 litre buckets**

Total capacity = **3 + 4 = 7 litres**

(d) **5 & 6 litre buckets**

Total capacity = **5 + 6 = 11 litres**

Only option **(b)** gives the required **9 litres**.

Thus, the missing buckets must be:

4-litre and 5-litre buckets

Hence, the correct answer is option b.

---

7. **There are three bags, P, Q, and R, and the weight of each bag is a NATURAL NUMBER. Two bags have the same weight.**
• P and R weigh 4 kg together
• Q and R weigh 6 kg together
What is the MINIMUM possible weight of a bag?

a) 2 kg b) 3 kg c) 4 kg d) 1 kg

Answer: d

Solution:

Let the weights of bags **P, Q, and R** be natural numbers, with two of them equal.

Given:

P + R = 4

Q + R = 6

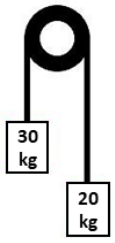
Here, we can see that R is present in both conditions.

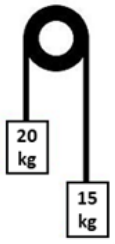
If P = Q, then, we cannot have different totals for P + R and Q + R.

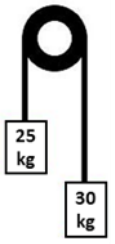
So, we have only two possible cases for two bags having same weight (P = R or Q = R)
Case 1: If **P = R**, then P + R = 4 gives P = 2 and R = 2. Then Q = 4.
Case 2: If **Q = R**, then Q + R = 6 gives Q = 3 and R = 3. Then P = 1.
The possible sets are **(2 kg, 4 kg, 2 kg)** and **(1 kg, 3 kg, 3 kg)**.
Therefore, the minimum possible weight is **1 kg**.
Hence, the correct answer is option d.

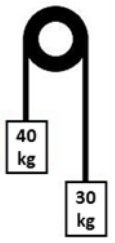
---

8. Find the odd one out.

a) 

b) 

c) 

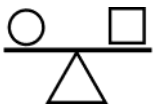
d) 

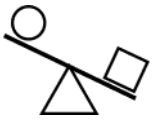
Answer: c
Solution:
In all the options, the block with lesser weight is in lower position except in option c.
Hence, the correct answer is option c.

---

9. What will come in place of "?" in the given series?

a) 

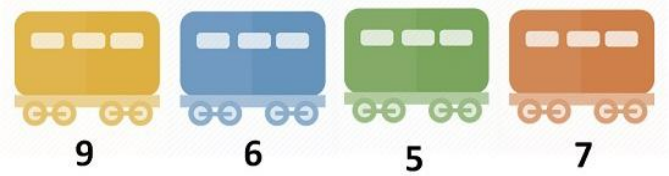
b) 

c) 

d) 

Answer: b
Solution:
There are three changes happening in the series.
Rule 1: Scales are tipped - left, straight, right, straight,…
Rule 2: Three shapes: Square, Triangle, and Circle are used. In each term, two shapes are present. The shape on the right in the current term becomes the left shape in the next term, and the shape missing in the current term becomes the right shape in the next term. This pattern continues throughout the series.
Rule 3: The support triangle (pivot) on which the balancing plank rests alternates in black and white.
Since the pivot triangle in the fifth term is black, it will be white in the next term. The scales in the fifth term are tilted to the left, so they will be straight in the next term. The shapes present are circle on the left and square on the right, which matches option b. Hence, the correct answer is option b.

10. The numbers below the bogies show the number of passengers each bogie can carry.
A train is formed using three bogies, each of a different colour, and one of them must be green.
What is the MAXIMUM total number of passengers the train can carry?

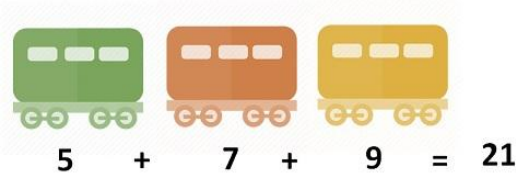


a) 21 b) 17 c) 23 d) 18

Answer: a

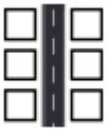
Solution:

We must select three bogies, each of a different colour, and one of them must be green.
To maximize the number of passengers we have to take the bogies that have the highest capacity.
The bogie with the maximum capacity is the yellow bogey that has a capacity of 9 passengers.
The bogie with the second highest capacity is the red bogey which has a capacity of 7 passengers.
It is given that one of the bogies must be green. Thus, the third bogie is the green bogie with a capacity of 5 passengers.
Therefore, the three bogies are green, red, and yellow which will carry 21 passengers.
Hence, option a is the correct answer.



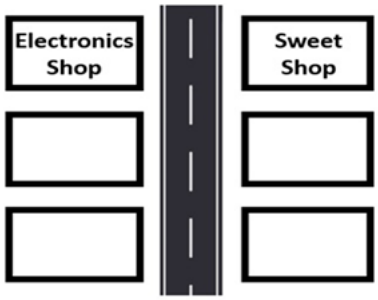
The Thinking Spot

A road has shops on both sides (left and right as shown in the image below) such that:
• The Sweet shop is on the opposite side of the Electronics shop
• The Toy shop is next to the Electronics shop
• On the opposite side of the Toy shop is the Furniture shop
• The Clothes shop is next to the Toy shop
• The Dairy shop is next to the Furniture shop
Which shop is on the same side of the road as the Dairy shop?

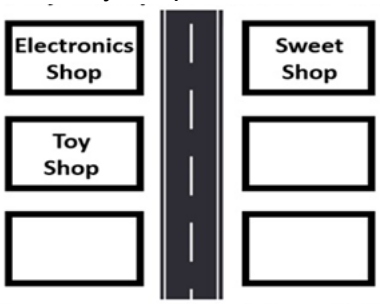


(a) Toy Shop (b) Clothes Shop (c) Electronics Shop (d) Sweets Shop
Answer: d
Solution:
The first step to solve these questions is to map the given information:

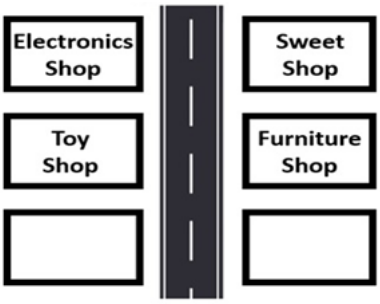
- The Sweet shop is on the opposite side of the Electronics shop



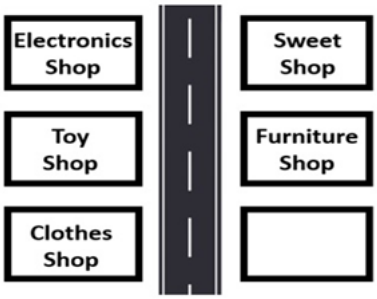
- The Toy shop is next to the Electronics shop



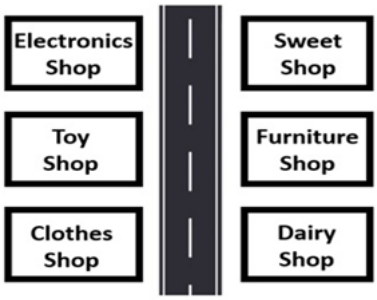
- On the opposite side of the Toy shop is the Furniture shop



- The Clothes shop is next to the Toy shop



- The Dairy shop is next to the Furniture shop



Hence, from the options, the shop which is on the same side of the road as the Dairy shop is Sweets Shop. Thus, the correct answer is option d.

Chapter 9: Coconut Farm

1. **Given below is a question followed by two statements. Identify which of the following statement(s) is/are necessary to answer the question.**
   Question: Four students are added to a dance class. Will the teacher be able to divide her students evenly into a dance team (or teams) of 8?
   Statement A: If 12 students were added, the teacher could put everyone in teams of 8 without any leftovers.
   Statement B: The number of students in the class is currently not divisible by 8.

   a) Statement A alone is sufficient
   b) Statement B alone is sufficient
   c) Both statements are required
   d) None of the above

   Answer: a

   Solution:

   We want to check:

   Four students are added to a dance class. Will the teacher be able to divide her students evenly into a dance team (or teams) of 8?

   We look at each statement separately.

   Statement A

   If 12 students were added, the teacher could form teams of 8 with no one left out.

   This means that **after adding 12 students**, the class fits perfectly into groups of 8.

   Now think about it logically:

   - Out of the **12 students added**, **8 students themselves can form one complete team**
   - If we remove that **one full team of 8**, we are left with **only 4 additional students added to the class**
   - Removing a **complete team** does not disturb the rest of the grouping

   So, if the class could be divided perfectly **after adding 12**, it would **still divide perfectly after adding only 4**.

   Therefore, **Statement A alone tells us the answer.**

   Statement B

   The current number of students is not divisible by 8.

   This only tells us that **right now the class cannot be divided into teams of 8 perfectly.**

   But that does **not help us know what will happen after adding 4 students**.

   - In some cases, adding 4 students might make the number perfect for teams of 8
   - In other cases, it might still not work

   Since both possibilities exist, we **cannot be sure**. **Statement B is not sufficient.**

   Hence, statement A alone is sufficient to answer the given question. Thus, option a is the correct answer.

---

2. **There are 24 soldiers in an army. A commando wants to arrange them in rows and columns such that:**

   - **Each row has the same number of soldiers across all the rows**
   - **Each column has the same number of soldiers across all the columns**
   - **Several rows and columns are formed**

   In how many different ways can this arrangement be done? Note: *Number of rows and columns are not same*

   a) 4
   b) 3
   c) 6
   d) 8

   Answer: c

Solution:

There are 24 soldiers in the army. The commando wants to arrange them in such a way that the number of people in each row is the same, and the number of people in each column is also the same.

As we need multiple rows and columns, 1 × 24 cannot be considered as an arrangement.

All possible row × column arrangements of 24 are:

- 2 rows × 12 columns
- 12 rows × 2 columns
- 3 rows × 8 columns
- 8 rows × 3 columns
- 4 rows × 6 columns
- 6 rows × 4 columns

Each of these arrangements satisfies the given condition.

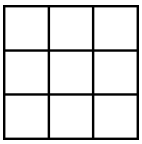
Therefore, the total number of possible arrangements is **6**. Hence, the correct answer is option c.

---

3. Some natural numbers from 101 to 200 are to be placed in the 3 × 3 grid shown below. The arrangement must follow these rules:

1. **In each row and each column, the three numbers must leave different remainders when divided by 3**
2. **No number can be repeated**

Which of the following statements is correct?



a) A row can have three consecutive even numbers

b) A row can have three consecutive odd numbers

c) A row can have three consecutive numbers

d) All of these

Answer: d

Solution:

When a number is divided by **3**, the possible remainders are **0, 1, or 2**.

In each row and column, the three numbers must therefore give **three different remainders**.

1) Three consecutive numbers

Consecutive numbers increase by **1**, so their remainders follow:

0 - 1 - 2 (in some order).

Hence, they always give **three different remainders**.

2) Three consecutive even numbers

Even numbers increase by **2** each time.

When a number increases by **2**, the remainder moves **two steps forward** in the cycle **0 - 1 - 2 - 0**, giving:

0 - 2 - 1 (in some order).

So again, all **three remainders appear**.

3) Three consecutive odd numbers

Odd numbers also increase by **2**, so the same logic applies.

They also produce **three different remainders**.

Since **all three cases give the remainders 0, 1, and 2**, each arrangement is possible.

Hence, the correct answer is option d.

4. **A three-digit number divisible by 18 leaves a remainder of 6 when divided by 12. How many different possible values can this number have?**

a) 50 b) 26 c) 25 d) 20

Answer: c

Solution:

If a number is **divisible by 18**, it must be a multiple of 18.
Now, check what happens when multiples of 18 are divided by 12.
Let's look at a few three-digit multiples of 18 and divide them by 12:
18 x 5 = 90, 18 x 6 = 108, 18 x 7 = 126, and so on. So, let's start with 108.

- 108: 108 ÷ 12 leaves remainder **0**
- 126: 126 ÷ 12 leaves remainder **6**
- 144: 144 ÷ 12 leaves remainder **0**
- 162: 162 ÷ 12 leaves remainder **6**

We can see a pattern:
Multiples of 18 leave remainders **0 and 6 alternately** when divided by 12.
So, we only need to count the three-digit multiples of 18 that leave remainder **6**.
The smallest three-digit multiple of 18 is **108**.
The largest three-digit multiple of 18 is **990**.
Number of three-digit multiples of 18:
990 ÷ 18 = 55
108 ÷ 18 = 6
So, the multiples go from the 6th multiple to the 55th multiple.
Total multiples = 55 − 6 + 1 = **50**
Since the remainders alternate (0, 6, 0, 6, …starting from 0,), exactly **half** of them leave remainder 6.
Half of 50 = **25**
Hence, the correct answer is option c.

---

5. **Which of the following operators CANNOT replace "@" to satisfy the condition given below?**

10 @ 1 < 11

a) ÷ b) - c) × d) +

Answer: d

Solution:

The logical approach to solving the question is to recognize that the value of "10 @ 1" must be less than 11. Therefore, "+" cannot replace "@" because it would make the value of "10 @ 1" equal to 11, which does not satisfy the condition of being less than 11.
Rest of the operators will satisfy the condition:
Option a (÷): 10 ÷ 1 = 10, and since 10 < 11, this satisfies the condition
Option b (-): 10 - 1 = 9, and since 9 < 11, this satisfies the condition
Option c (×): 10 × 1 = 10, and since 10 < 11, this satisfies the condition
Thus, the only operator that does not satisfy the condition is +.
Hence, the correct answer is option d.

6. **Each of the letters A, B, C, D, E, and F is assigned a value, shown by the mathematical expression written above it. If the letters are rearranged in descending order of their values, how many letters will stay in the same position as before?**

42 x 1	22 x 2	60 x 0	16 x 4	12 x 3	10 x 5
A	B	C	D	E	F

a) 0 b) 1 c) 2 d) More than 2

Answer: b

Solution:

As shown in the image given below, after rearrangement, only letter E remains in the same position. Therefore, the correct answer is option b.

	42 x 1	22 x 2	60 x 0	16 x 4	12 x 3	10 x 5
	A	B	C	D	E	F
After solving	42	44	0	64	36	50
Descending order	64	50	44	42	36	0
	D	F	B	A	E	C

---

7. **Captain Malhotra has to align his troop of soldiers into some rows. Each row should have exactly 25 soldiers. He knows the total number of soldiers in his troop. He wants to find out if any soldiers will be left out after the alignment is done. How can he do this?**

a) Divide the total number of soldiers by 5 and check if the remainder left is 0
b) Divide the total number of soldiers by 15 and check if the remainder left is 0
c) Divide the total number of soldiers by 25 and check if the remainder left is 0
d) None of these

Answer: c

Solution:

If the total number of soldiers is t, then dividing t by 25 will give a quotient and a remainder. Quotient will give the number of rows formed and remainder will give the soldiers left out. Hence, the correct answer is option c.

---

8. **An employee at a pizza shop works for 15 days, receiving 2 slices of pizza each day he works. Each pizza contains 8 slices. By the end of 15 days, how many whole pizzas and individual slices has he received?**

a) 4 pizzas and 2 slices
b) 2 pizzas and 6 slices
c) 3 pizzas and 6 slices
d) 3 pizzas and 4 slices

Answer: c

Solution:

An employee works for 15 days and receives 2 slices of pizza for each day worked. So, the total number of slices the employee receives is: 15 × 2 = 30 slices.

Since each pizza contains 8 slices, let's calculate how many full pizzas the employee received: 30 slices ÷ 8 slices per pizza = 3 full pizzas with a remainder.

After receiving 3 full pizzas (3 × 8 = 24 slices), the remaining slices are: 30 slices - 24 slices = 6 slices left.

Therefore, the employee received 3 full pizzas and 6 additional slices.

Hence, the correct answer is option c.

9. If the multiplication operator is placed only between two even digits and an addition operator is placed in any other case, then which of the following expressions gives the highest output?

a) 3 _ 2 _ 4 _ 7 b) 5 _ 2 _ 6 _ 3 c) 3 _ 9 _ 2 _ 4 d) 6 _ 4 _ 3 _ 7

Answer: d

Solution:

Substituting multiplication operator between even digits and addition operator in remaining places, we get,

option a) 3 + 2 x 4 + 7 = 18

option b) 5 + 2 x 6 + 3 = 20

option c) 3 + 9 + 2 x 4 = 20

option d) 6 x 4 + 3 + 7 = 34

The option with the highest value is option d = 34. Hence, the correct answer is option d.

---

10. Find the next term of the given series:

8, 24, 12, 36, 18, 54, ?

a) 27 b) 28 c) 37 d) 39

Answer: a

Solution:

In the given series, the terms follow an **alternating pattern**:

each term is **first multiplied by 3** and then the next term is **divided by 2**.

Now, observe how each term is formed:

8 x 3 = 24, 24 ÷ 2 = 12, 12 x 3 = 36, 36 ÷ 2 = 18, and 18 x 3 = 54.

Following the same pattern, the next operation will be **division by 2**:

54 ÷ 2 = 27.

Thus, the next term in the series is **27**.

Hence, the correct answer is option a.

Exactly one letter of the given word should be replaced with any other letter of the English alphabet to form a number name. How many number names can be formed this way?
Note: *The remaining letters of the word cannot be rearranged to form a meaningful word*

F I N E

(a) 3 (b) 2 (c) 1 (d) 0
Answer: b
Solution:
Let's follow a systematic approach to solve this problem.
Given that exactly one letter of the given word should be replaced with any other letter of the English alphabet to form a number name.
From left to right, let's analyse replacing a letter and check if it forms a number name.

Case 1: Replacing the first letter from the left.
__ I N E
The only possibility is to fill in the blank with 'N', such that 'NINE' can be formed.

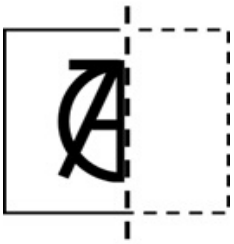
Case 2: Replacing the second letter from the left.
F __ N E
No number name can be formed by filling in the blank.

Case 3: Replacing the third letter from the left.
F I __ E
The only possibility is to fill in the blank with 'V', such that 'FIVE' can be formed.

Case 4: Replacing the fourth letter from the left.
F I N __
No number name can be formed by filling in the blank.
Therefore, two number names can be formed - NINE and FIVE.
Option b is the correct answer.

Chapter 10: Symmetrical Designs

1. **A transparent symmetrical sheet of paper has letters written on it and is folded in half. Which of the following letters given in the options is NOT present if the given sheet is unfolded?**



a) N b) T c) A d) O

Answer: a

Solution:

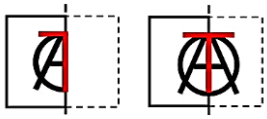
To solve this question, we recognize that the sheet is transparent and has been folded in half. The elements we see in the folded half result from what is present on both the left and right sides of the question image.

It is given that the transparent sheet of paper is symmetrical. This means the left part of the image is identical to the right part. To determine which letters will appear when the sheet is unfolded, we note that the image on the left will be mirrored on the right side.

Therefore, if the left part of a letter is visible in the left half of the sheet, that letter will also be present when the paper is unfolded. Let's check each of the options:

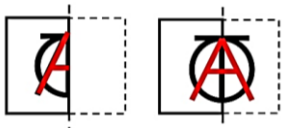
Option b: T

Left half of the letter T is present on the folded sheet. So, T is present.



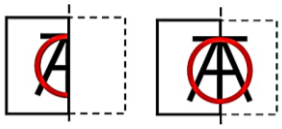
Option c: A

Left half of the letter A is present on the folded sheet. So, A is present.



Option d: O

Left half of the letter O is present on the folded sheet. So, O is present.

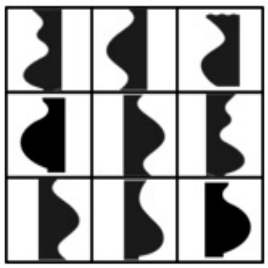


Option a: N

Left half of the letter N is not present on the folded sheet. So, N is not present on the sheet.

Hence, the correct answer is letter is N. Thus, the correct answer is option a.

2. **Some symmetrical figures are cut into two halves and placed in the grid below. Which of the following options has only one half present in the grid?**

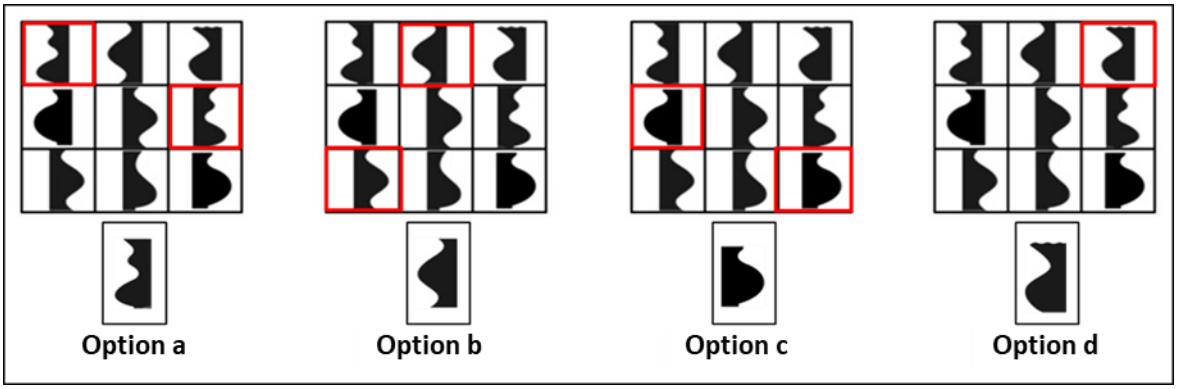


a)  b)  c)  d) 

Answer: d

Solution:

As highlighted below, option d has only one-half present in the grid. Hence, the correct answer is option d.



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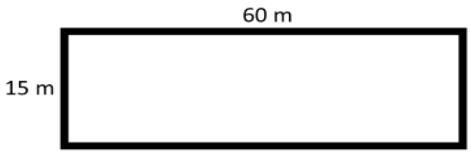
3. **At least how many times should the given paper sheet be folded in half to make a square?**

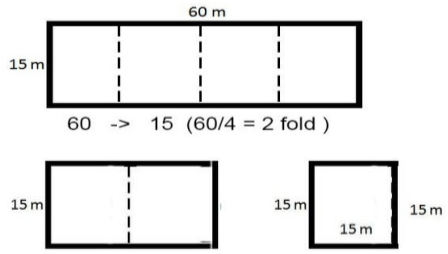


a) 0 b) 1 c) 2 d) 3

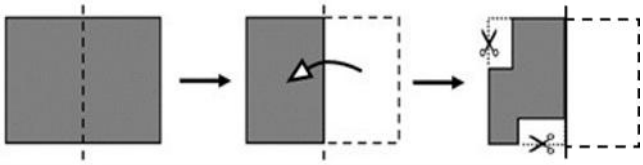
Answer: c

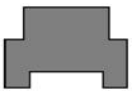
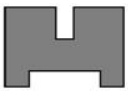
Solution:

One fold along the longer side (60 m) will lead to a rectangle with length 30 m (60 ÷ 2) and breadth 15 m. Another fold along the same side will lead to a square with sides 15 m (30 ÷ 2) and 15 m. Hence, 2 folds are required. Thus, the correct answer is option c.



4. **A sheet of paper is folded in half and after folding, some part is cut as shown in the image below. Now the sheet is unfolded. Choose the option which represents the piece after unfolding.**



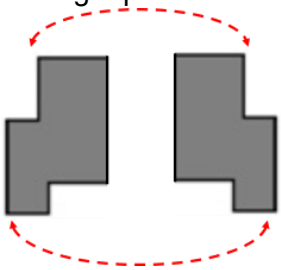
a)  b)  c)  d) 

Answer: b

Solution:

After cutting some parts of the sheet, we get the left part as:

The right part will be like:



Together, the image will look like:

The above image is same as option b. Thus, option b is the correct answer.

---

5. **Along how many different lines can a circular sheet be folded into half?**

a) 1 b) 2 c) 100 d) More than 100

Answer: d

Solution:

A circle can be folded into two equal halves only if the fold passes through its centre.

Any line that passes through the centre of a circle is called a **diameter**.

A circle has **infinitely many diameters** because a line can pass through the centre at any angle.

Therefore, there are **infinitely many different lines** along which a circular paper can be folded into two equal halves. Since **infinity is more than 100**, the correct answer is **option d**.

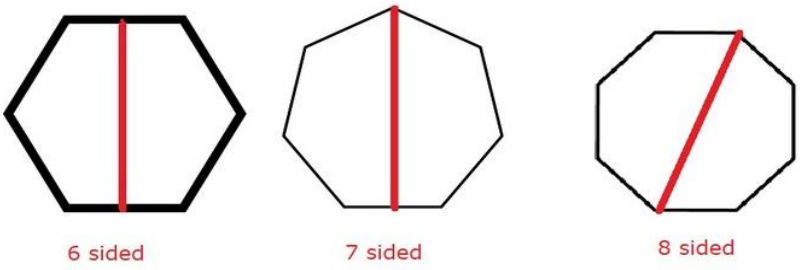
6. **A symmetrical paper sheet is in the form of a polygon. It is cut into halves so that each half forms a polygon of 5 sides. How many sides were possibly there in the original paper sheet?**

a) 6 b) 7 c) 8 d) All of these

Answer: d

Solution:

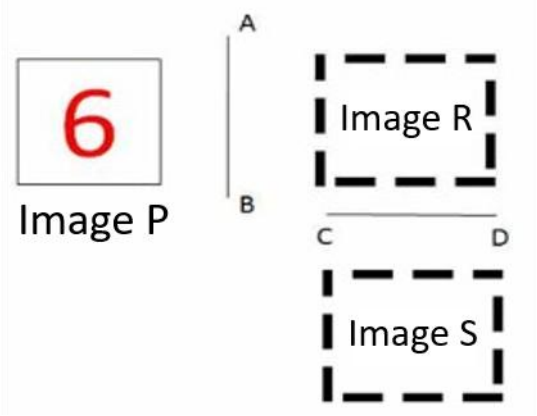
The original sheet can have either 6, 7, or 8 sides as shown below:



As shown above, six, seven, and eight-sided figures can be divided in half to form a five-sided figure. Therefore, the correct answer is option d.

---

7. **The given Image P is first reflected along the line AB to obtain Image R. Then, Image R is reflected along the line CD to obtain Image S. Which of the following options is the same as Image S?**



a) 

b) 

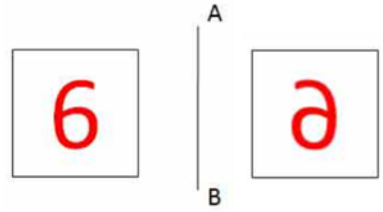
c) 

d) 

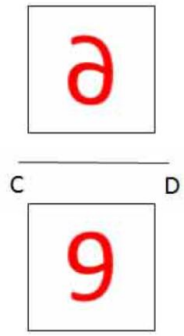
Answer: c

Solution:

Let us first reflect the given figure along the mirror AB.



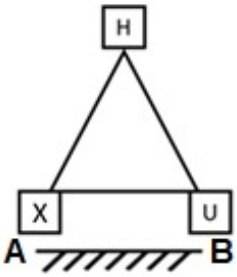
Now reflecting the reflected image along mirror CD:



The image obtained is similar to the image in option c. Hence, the correct answer is option c.

---

8. Which of the following pairs of letters will have the same image if they are reflected in a mirror placed along the line AB?

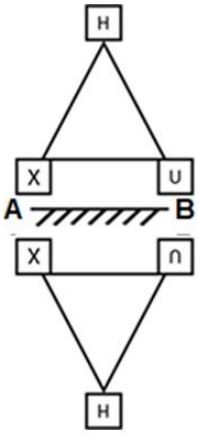


a) H and U b) X and U c) H and X d) All of the above

Answer: c

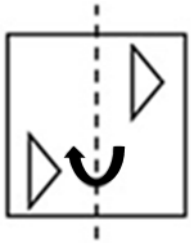
Solution:

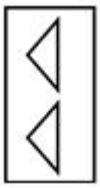
Option c: H and X will have the same image. Hence, the correct answer is option c.



9. A transparent sheet of paper of the given shape is folded along the dotted line in the direction as shown by the arrow. What will the folded sheet look like?

Note: *You cannot rotate the question or option images*



a)  b)  c)  d) 

Answer: c

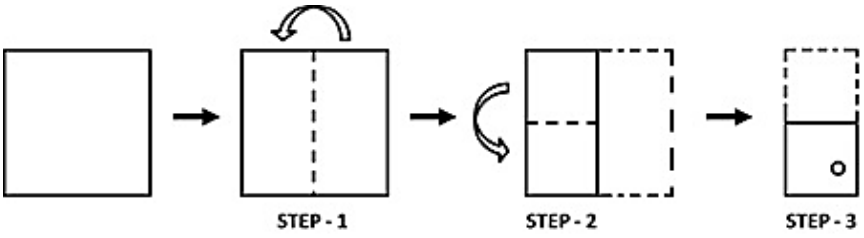
Solution:

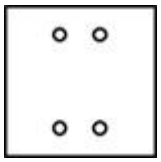
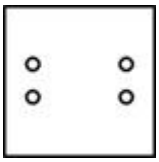
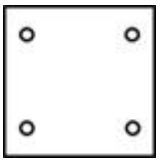
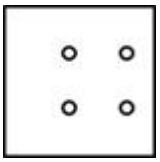
On folding the sheet, the lower triangle which is pointing to the right direction will be the same, but the upper triangle which is pointing in the right direction will now point in the left direction.

Hence, the answer is option c.

---

10. A sheet of paper is folded along the dotted line in steps 1 and 2, as shown in the image below. After this, a hole is made, as shown in step 3. How will the paper look after it is unfolded?



a)  b)  c)  d) 

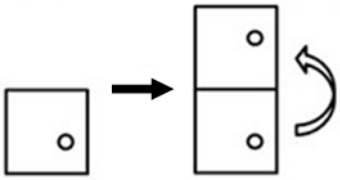
Answer: a

Solution:

Such types of questions must be solved by **keenly observing the visual cues**.

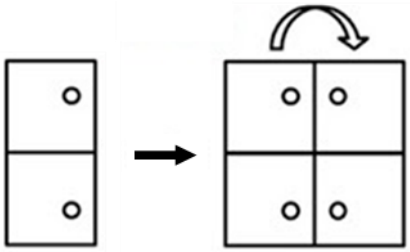
Let us unfold the paper in **reverse order**.

First, let us open the paper **vertically**.

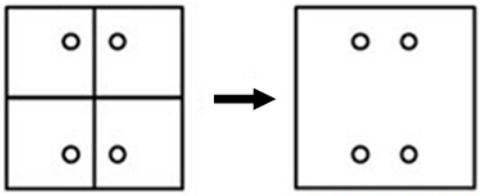


Here, we can see that the holes are **closer to the top and bottom edges and nearer to the folded edge**.

Now, let us unfold the paper **horizontally**.

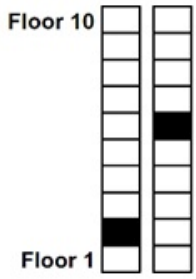


Here, we can see that the holes are **nearer to the centre**.
As shown below, the obtained sheet of paper is **similar to option a**. Hence, the correct answer is **option a**.



Option a

Given below is a 10-storey building with 2 elevators, with their current positions highlighted in black. If the buttons for both elevators are pressed simultaneously on floor 1, and both elevators travel at the same speed to the topmost floor and return to the 1st floor without stopping, on which floor will they meet?



(a) Floor 7 (b) Floor 8 (c) Floor 9 (d) Floor 10

Answer: b

Solution:

Approach to Solve the Problem:

The only time the two elevators will meet on the same floor is when they are traveling in opposite directions. Initially, both elevators are moving toward the top floor.

• There is a difference of 4 floors between the two elevators

• When the second elevator reaches the 10th floor, the first elevator will be on the 6th floor (as shown in Image 1)

1. Direction Change: From this point onward, both elevators will move in opposite directions

2. Meeting Point: When the first elevator is on the 7th floor, the second elevator will be on the 9th floor (as shown in Image 2)

Now they will meet on the 8th floor (as shown in Image 3):

1. The first elevator moves up from the 7th to the 8th floor, and

2. The second elevator moves down from the 9th to the 8th floor

Hence, option b is the correct answer.

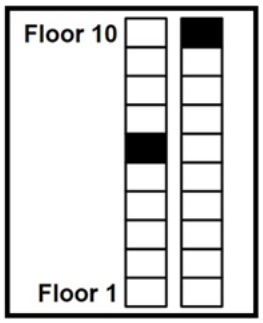


Image 1

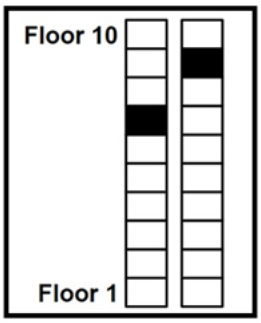


Image 2

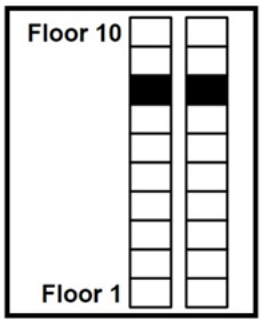


Image 3

Chapter 11: Grandmother's Quilt

1. **A piece of regular hexagonal paper is cut along a line joining two opposite corners. What would be the areas of the two pieces?**

   a) Areas would be unequal
   b) Areas would be equal to each other
   c) Area would be one fourth of original sheet
   d) Cannot be determined

   Answer: b

   Solution:

   When a regular hexagon is cut along a line joining two opposite corners, the line passes through the centre of the hexagon. This diagonal divides the shape into two parts that are symmetrical (mirror images of each other).

   Since the cut splits the hexagon into two symmetrical regions, both have areas **equal to each other.** Hence, the correct answer is option b.

---

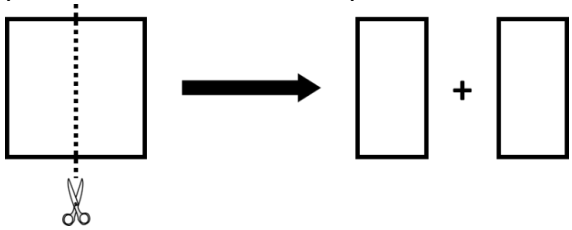
2. **If a square sheet is cut in half along one of its sides, how does the perimeter of the original square compare with the combined perimeter of the two new shapes formed?**

   a) The combined perimeter is greater than the perimeter of the original square
   b) The combined perimeter is less than the perimeter of the original square
   c) The combined perimeter is equal to the perimeter of the original square
   d) Cannot be determined

   Answer: a

   Solution:

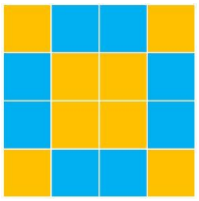
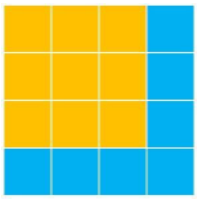
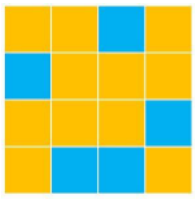
   When the square is cut into two equal halves, the line along which it is cut becomes a new outer edge for both pieces. This edge was not part of the original perimeter, but after cutting, it is counted in the perimeter of each new shape.



   Since this new edge is counted twice, once for each piece, the combined perimeter of the two new shapes is greater than the perimeter of the original square. Hence, option a is the correct answer.

---

3. **Which option has the maximum area filled with orange colour?**

   a) 
   b) 
   c) 
   d) 

   Answer: d

   Solution:

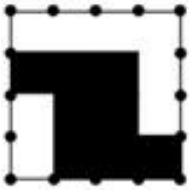
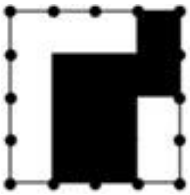
   Each option shows a 4 × 4 grid, which means there are 16 equal blocks in each figure.

   Since all blocks are of equal size, the option with the maximum number of orange blocks will have the maximum orange area.

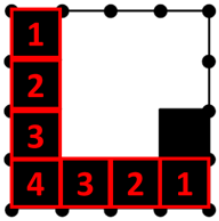
Now, count the number of orange blocks in each option:
Option a: 10 orange blocks
Option b: 8 orange blocks
Option c: 9 orange blocks
Option d: 11 orange blocks
Since 11 is the highest number of orange blocks, the maximum orange area is in option d.
Hence, the correct answer is option d.

---

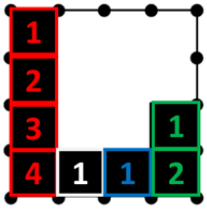
4. Which of the following grids does NOT have an EQUAL portion of black and white area?
Note: *The dots along each edge are spaced equidistantly*

a)  b)  c)  d) 

Answer: c
Solution:
Since the dots along the edges are equidistant, you can imagine connecting them with straight lines to form a grid of equal-sized squares.
Why are these equidistant dots important?
1. Equal Units: The equidistant dots help us divide the entire grid into equal squares. This creates a uniform unit of measurement across the grid.
2. Area Comparison: Since all the squares are of the same size, we can simply **count the number of black and white squares** to compare the areas.
Simplified strategy:
• Visualize or lightly sketch the grid lines between the dots to create a "graph-paper" effect
• Count the black and white squares in each option
Let us have a visual representation of this:



As we can see above, the number of squares in a column and in a row is 4, which means the total number of squares in a grid will be 16.
Let us analyse each option one by one:
Option a: Number of black blocks in option a are:
Column 1: 4
Column 2: 1
Column 3: 1
Column 4: 2
Total black blocks: 4 + 1 + 1 + 2 = 8. Since 8 is half of 16, there are an equal number of white and black blocks in option a.



Option b: Number of black blocks in option b are:

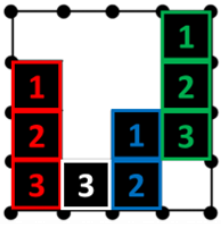
Column 1: 1
Column 2: 3
Column 3: 3
Column 4: 1

Total black blocks: 1 + 3 + 3 + 1 = 8. Since 8 is half of 16, there are an equal number of white and black blocks in option b.

Option c: Number of black blocks in option c are:

Column 1: 3
Column 2: 1
Column 3: 2
Column 4: 3

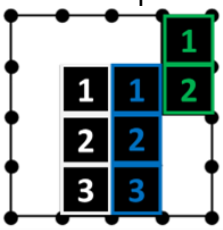
Total black blocks: 3 + 1 + 2 + 3 = 9. Since 9 is not half of 16, option c does not have an equal number of black and white blocks in it.



Option d: Number of black blocks in option d are:

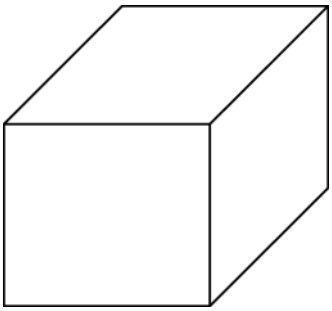
Column 1: 0
Column 2: 3
Column 3: 3
Column 4: 2

Total black blocks: 0 + 3 + 3 + 2 = 8. Since 8 is half of 16, there are an equal number of white and black blocks in option d.



Option c has more number of black boxes than white boxes. Thus, option c is the correct answer.

5. The Length and Breadth of a cube are reduced to half. The areas of how many faces of the cube will become exactly half because of this?



a) 0 b) 2 c) 4 d) 6

Answer: c

Solution:

Area of the 6 faces separately for each face are as follows:

Face 1: L x B

Face 2: L x B

Face 3: B x H

Face 4: B x H

Face 5: L x H

Face 6: L x H

After the length and breadth are reduced to half, the areas would be as below:

Face 1: 0.5 L x 0.5 B (one fourth of original)

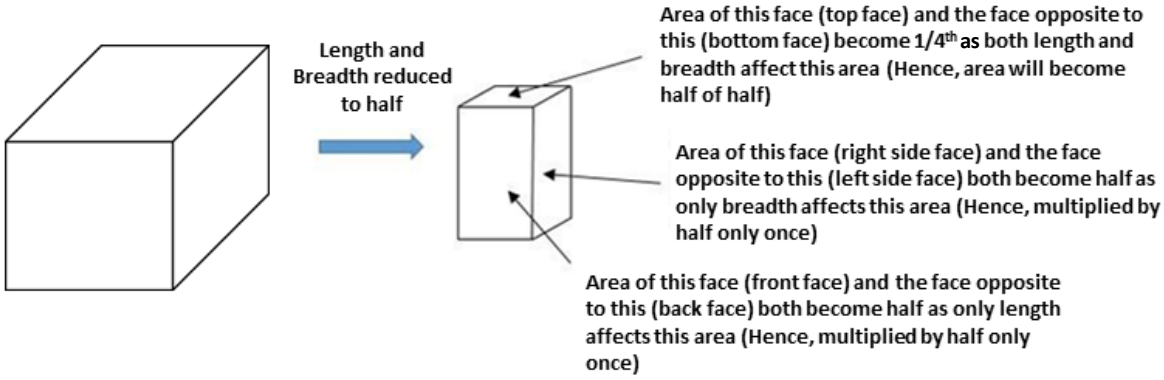
Face 2: 0.5 L x 0.5 B (one fourth of original)

Face 3: 0.5 B x H (half of original)

Face 4: 0.5 B x H (half of original)

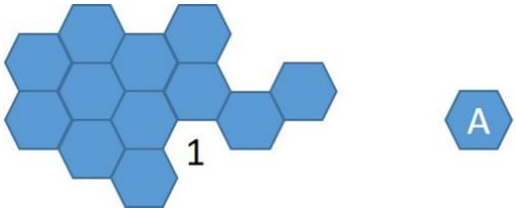
Face 5: 0.5 L x H (half of original)

Face 6: 0.5 L x H (half of original)



As shown above, there are 4 faces whose area will become exactly half after length and breadth of the cube are reduced to half. Hence, the correct answer is option c.

6. What will happen to the overall perimeter of the puzzle if piece A is placed at position 1?



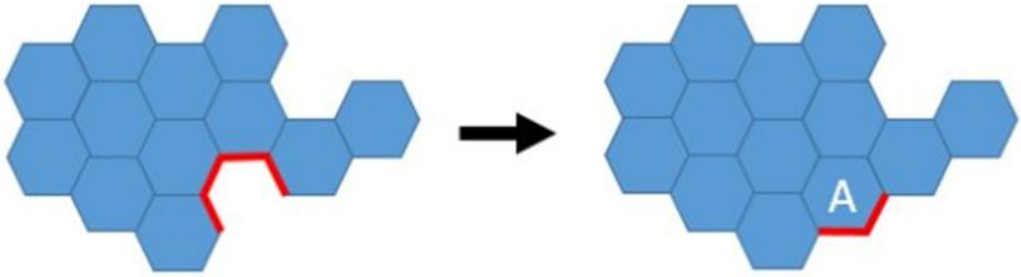
a) It will increase
b) It will decrease
c) It will remain unchanged
d) Cannot say

Answer: b

Solution:

The perimeter of a shape is the addition of all the sides of the shape.

When Piece A is added to Position 1, four sides are removed from the perimeter, but only two sides are added. Hence, the overall perimeter decreases. Thus, the correct answer is option b.



---

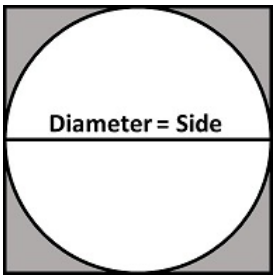
7. If the diameter of a circle is equal to the side of a square, what can you say about the area of both the shapes?

a) The area of the circle is greater than that of the square
b) The area of the square is greater than that of the circle
c) The area of the square is the same as that of the circle
d) None of these

Answer: b

Solution:

The circle **cannot cover the corners** of the square. That means the square **always has extra area** that the circle does not cover. Hence, the correct answer is option b.



8. **Question: How many metres of wire are needed to cover the perimeter of the field once, without overlapping?**
Information 1: The shape of the field is an isosceles triangle
Information 2: One of the sides of the field has length 16 metres and another side has length 40 metres
To answer the given question, which of the given information is/are sufficient?

a) Only 1
b) Only 2
c) Both 1 and 2 together
d) Question cannot be answered even if both information are used

Answer: c

Solution:

To find the **wire required to cover the perimeter of the field once, without overlapping**, we must know the **perimeter of the field**, i.e., the **sum of all three sides of the triangle**.

Information 1:

The field is an **isosceles triangle**, which means **two sides are equal**.
However, this information alone does **not tell us the lengths of the sides**, so we cannot find the perimeter.

Information 2:

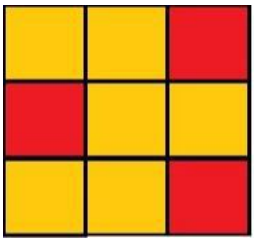
Two sides of the field are **16 m and 40 m**.
However, this information alone does not tell us the **shape of the field**. Since the shape is unknown, we cannot determine how many sides the field has or find its perimeter.

Using both Information 1 and 2 together:

Since the triangle is **isosceles**, two sides must be equal.
The equal sides **cannot both be 16 m**, because:
16 + 16 = 32, which is **less than 40**, and in a triangle the sum of any two sides must be **greater than the third side**. So, this case is not possible.
Therefore, the **two equal sides must be 40 m**, and the third side is **16 m**.
So, the sides of the triangle are: **40 m, 40 m, and 16 m**.
Perimeter = 40 + 40 + 16 = **96 m**
Since the perimeter can be determined **only when both pieces of information are used together**, the correct answer is: **option c: Both 1 and 2 together.**

---

9. **In the given square, there are some red blocks and some yellow blocks each being equal in area. Find the area occupied by the red blocks if the side of the bigger square is equal to 6 units.**

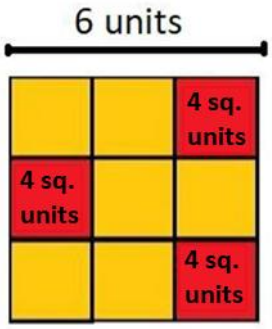


a) 6 sq. units b) 12 sq. units c) 8 sq. units d) 16 sq. units

Answer: b

Solution:

The side of the square is 6 units. There are 3 small squares. So, the side of each small square will be 6 ÷ 3 = 2 units.



Since the side is 6 units, the area becomes 36 square units. Each smaller square has a side of 2 units, making the area of each smaller square 4 square units.
So, the area occupied by the red blocks = 4 x 3 = 12 sq. units. Hence, option b is the correct answer.

---

10. Two identical polygonal shaped paper sheets A and B are taken and joined (not overlapping) along an equal side. What would be the perimeter of the resultant paper sheet?

a) More than twice the perimeter of sheet B
b) Lesser than twice the perimeter of sheet B
c) Twice the perimeter of sheet B
d) None of these

Answer: b

Solution:

Given:

- Two identical polygonal sheets, **A** and **B**
- They are joined along **one equal side**
- We are asked about the perimeter of the **resultant shape**

Step 1: Recall perimeter definition

The **perimeter** is the total length around a shape.

- Sheet A perimeter = P
- Sheet B perimeter = P
- Let the length of the **side where they are joined** = s

Step 2: Consider what happens when joining

- When you join A and B along one side, that **common side is no longer part of the outer boundary**
- So, we **subtract the joining side from each sheet**

Perimeter of new shape = P – s + P – s = 2P – 2s

Step 3: Compare with twice the original perimeter

- Twice the perimeter of sheet B = 2P
- Perimeter of the joined shape = 2P – 2s < 2P

Step 4: Conclusion

The perimeter of the resultant sheet is **less than twice the perimeter of sheet B**.
Hence, the correct answer is option b.

The Thinking Spot

Maths, English, Science, History, French, and Geography books are stacked one above the other. The Maths book is stacked below only 2 books. Five books are stacked on top of the French book. The Geography book has only 1 book below it, and History is not one of the 2 books stacked above Maths. If Ms. Patsy pulls out the top two books from the stack, which two books did she pull out?

(a) Maths and Science
(b) History and English
(c) Science and English
(d) Cannot be Determined

Answer: c

Solution:

A. Maths book is stacked below only 2 books. Therefore, Maths is the 3rd book from the top.
B. 5 books are stacked on top of the French book. Therefore, French is the 6th book from the top.
C. Geography book has only 1 book below it. It means that Geography is the 5th book from the top.
D. History is not one of the 2 books stacked above Maths. Therefore, the only place the history book can be is 4th from the top.

Thus, only 2 books, English and Science are left which can be stacked above Maths.
So, Ms. Patsy pulls out the English book and Science book.
Hence, the correct answer is option c.

Chapter 12: Racing Seconds

1. **Tom started playing cricket with his friends at 10:15 AM. They played for 1 hour and 15 minutes before stopping for lunch, which they completed by 12:30 PM. How long did their lunch take?**

   a) 45 minutes b) 60 minutes c) 90 minutes d) 75 minutes

   Answer: b

   Solution:

   Tom started playing cricket at 10:15 AM.

   They played for 1 hour and 15 minutes before stopping for lunch.

   So, the time when they stopped playing is:

   10:15 AM + 1 hour 15 minutes = 11:30 AM

   They started their lunch at 11:30 AM and completed it by 12:30 PM.

   Therefore, the time taken for their lunch is:

   12:30 PM - 11:30 AM = 1 hour (which is 60 minutes).

   Hence, the correct answer is option b.

---

2. **A light bulb is turned ON for seven minutes and OFF for seven minutes. This process is then repeated. At what time will the light bulb be turned on for the 4th time?**

   a) Beginning of 43rd minute b) Beginning of 29th minute

   c) Beginning of 57th minute d) Beginning of 50th minute

   Answer: a

   Solution:

   The light bulb is turned ON for 7 minutes and OFF for 7 minutes, so it has a cycle of 14 minutes.

   Therefore, the first cycle starts at 0 minutes, the second at 15th minute, the third at 29th minute, and the fourth will be at 43rd minute.

   Therefore, the light bulb will be turned ON for the 4th time at the beginning of the 43rd minute.

   Hence, the correct answer is option a.

---

3. **A term is missing in between the sequence. Find the missing term.**
   10:15 AM, 10:45 AM, 11:15 AM, 11:45 AM, _____ , 12:45 PM, 1:15 PM

   a) 11:30 AM b) 12:15 PM c) 12:15 AM d) 12:30 PM

   Answer: b

   Solution:

   Each term shows a time that is 30 minutes ahead of the time in the previous term. Thus, the missing term is 11:45 AM + 30 minutes = 12:15 PM. Since it is after 12 o'clock, it will be PM. Hence, the correct answer is option b.

---

4. **If an alarm clock is set to ring every three hours, how many times will it ring between 8 AM and 4 PM, if it rings for the first time at 9 AM?**

   a) 1 b) 2 c) 3 d) 4

   Answer: c

   Solution:

   The alarm rings every three hours and the first ring is at 9 AM. So, it will ring at 9 AM, 12 noon, and then at 3 PM. Therefore, 3 rings. Hence, the correct answer is option c.

5. **A, B, C, and D are going to a party. A leaves home at 6:10 PM and reaches the party after 70 minutes. B reaches the party 30 minutes before A. If D reaches the party 60 minutes after C, at what exact time does D reach the party?**

a) 19:00 b) 18:30
c) 19:30 d) Cannot be determined

Answer: d

Solution:

Step 1 - Find A's arrival time

A leaves at 6:10 pm and reaches the party after 70 minutes.

So, A arrives at **6:10 PM + 70 minutes = 7:20 PM.**

Step 2 - Find B's arrival time

B arrives 30 minutes before A:

So, B arrives **at 7:20 PM − 30 minutes = 6:50 PM.**

Step 3 - What about C and D?

We only know the *relative* timing between C and D: D = C + 60 minutes.

But we are **not given** when C arrived (no absolute time for C). Without C's actual arrival time we cannot compute D's absolute arrival time.

There is insufficient information to determine the exact clock time D arrived.

Hence, the correct answer is option d.

---

6. **Four friends Mayank, Rahul, Sachin, and Virat have different writing speeds.**
   - **Mayank can write 2 pages in 10 minutes**
   - **Rahul can write 4 more pages than what Mayank writes in 10 minutes**
   - **In 15 minutes, Sachin can write half the number of pages as Rahul can write in 10 minutes**
   - **In 30 minutes, Virat finishes 1 page less than the number of pages Sachin finishes in 30 minutes**

   How many pages can Virat write in an hour?

a) 10 b) 8 c) 9 d) 12

Answer: a

Solution:

Mayank writes 2 pages in 10 minutes.

So, in 10 minutes, Mayank = 2 pages.

Rahul writes **4 more pages than Mayank in the same 10 minutes**.

So, Rahul writes **2 + 4 = 6 pages in 10 minutes**.

In 15 minutes, Sachin can write **half the number of pages** as Rahul can write **in 10 minutes.**

Half of Rahul's 6 pages is **3 pages**, so Sachin writes **3 pages in 15 minutes**.

Now, find how many pages Sachin writes in **30 minutes**.

If he writes 3 pages in 15 minutes, in 30 minutes (which is double the time), he writes **6 pages**.

Virat writes **1 page less than Sachin writes in 30 minutes**.

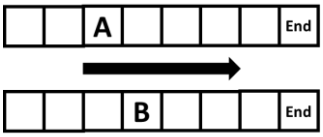
Sachin writes 6 pages in 30 minutes, so Virat writes **5 pages in 30 minutes**.

Now, find how many pages Virat writes in **1 hour (60 minutes)**.

If he writes 5 pages in 30 minutes, in 60 minutes (double the time), he writes **10 pages**.

Hence, the correct answer is option a.

7. **As shown in the image, A and B are racing towards the End box.**
A takes 5 seconds to move from one box to the next.
B takes 4 seconds to move from one box to the next.
How many seconds after B will A reach the End box?



a) 6 b) 9 c) 10 d) 8

Answer: b

Solution:

First, count the number of boxes each person must move to reach the **End**.

- **B** needs to move **4 boxes** to reach the End.
  Since B takes **4 seconds per box**, the total time taken by B is:
  4 × 4 = 16 seconds
- **A** needs to move **5 boxes** to reach the End.
  Since A takes **5 seconds per box**, the total time taken by A is:
  5 × 5 = 25 seconds

Now compare their finishing times:

25 − 16 = 9 seconds

So, **A reaches the End box 9 seconds after B.** Hence, the correct answer is option b.

---

8. **Mary and her sister went to a badminton game on Friday. They left the house at 5:25 PM and reached the badminton court 20 minutes before the game started. If it took them 5 minutes to drive to the badminton court, then at what time did the badminton game start?**

a) 06:00 PM b) 05:50 PM c) 05:45 PM d) 05:10 PM

Answer: b

Solution:

Mary and her sister left the house at 5:25 PM. It took them 5 minutes to drive to the badminton court. So, they arrived at the court at 5:25 PM + 0:05 = 5:30 PM.

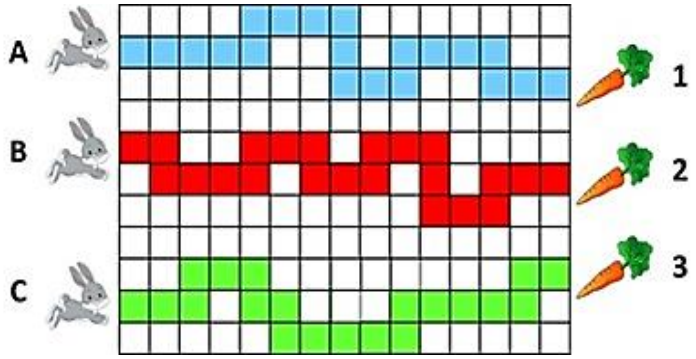
Now, they reached the badminton court 20 minutes before the game started. To find out the game's start time, add 20 minutes to the arrival time (5:30 PM):

5:30 PM + 0:20 = 5:50 PM

So, the badminton game started at 5:50 PM. Hence, the correct answer is option b.

9. **Rabbit A runs on blue-coloured boxes. Similarly, rabbit B runs on red-coloured boxes and rabbit C runs on green-coloured boxes. If each rabbit runs at the same speed and starts at the same time to reach the carrots, which among the following rabbits can be seen in the same column upon taking the 13th step?**

Note: *A column is a vertical stack of blocks in the given grid*



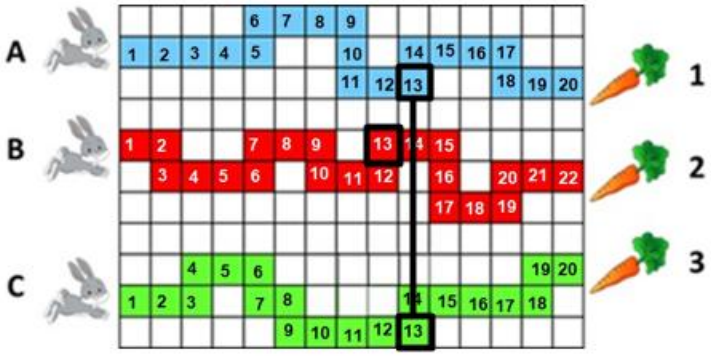
a) Rabbits A and B b) Rabbits B and C c) Rabbits A and C d) None of these

Answer: c

Solution:

If all the rabbits run at the same speed, they will cover equal distances in the same time. At their 13th step, Rabbits A and C can be seen in the same column.

Hence, the correct answer is option c.



---

10. **A and B are boarding different trains. B arrives at the station 10 minutes before A. B's train is scheduled to depart at 6:30 PM and he arrives 5 minutes before the scheduled departure. At what time is A's train scheduled if he reaches exactly on time?**

a) 6:20 PM b) 6:25 PM c) 6:30 PM d) 6:35 PM

Answer: d

Solution:

B arrived 5 minutes before his scheduled departure and his train is scheduled to depart at 6:30 PM.

So, B arrived at the station at 6:25 PM.

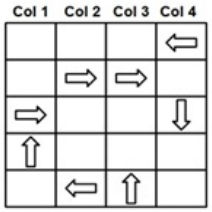
Also, it is mentioned that B arrived 10 minutes before A.

This means that A arrived at 6:35 PM.

As A reached exactly on time, we can conclude that his train is scheduled at 6:35 PM.

So, the correct answer is option d.

In the grid given below, if all the arrows move EXACTLY one block in the direction they are pointing to, then which column will have the MAXIMUM number of arrows?



(a) Column 1 (b) Column 2 (c) Column 3 (d) Column 4

Answer: c

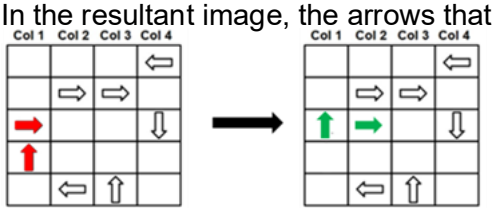
Solution:

It is mentioned that each arrow moves exactly one block in the direction it is pointing to. Let's solve this step by step.

COLUMN 1:

From column 1, visualise the movement of the two arrows which are highlighted in red.

In the resultant image, the arrows that reached their new positions are shown in green.



COLUMNS 2 and 3:

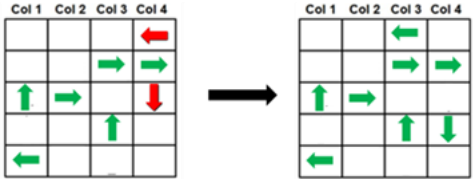
Similarly, columns 2 and 3 have four arrows as shown in red, initially.

As they move one step in their respective directions, the new positions can be visualised in green.

COLUMN 4:

Finally, column 4 has two arrows left (in red), which are yet to change their positions. Once done, the final grid looks like the image on the right.

Hence, the correct answer is option c.



Chapter 13: Animal Jumps

1. **I am a two-digit number. The digit in the ones place is twice the digit in the tens place. Which of the following numbers would I always be divisible by?**

   a) 4 b) 6

   c) 7 d) Both options a and b

   Answer: d

   Solution:

   Let the tens digit be **x**.

   Then the ones digit is **2x**.

   So, the number looks like:

   10x + 2x = 12x

   This means **every such number is a multiple of 12**.

   Now test divisibility:

   1. Divisible by 4?

   A number is divisible by 4 if its **last two digits** form a number divisible by 4.

   But the number is **12x**, and 12 is divisible by 4.

   So, **12x is divisible by 4 for every x**.

   2. Divisible by 6?

   A number is divisible by 6 if:

   - It is **even**, and
   - It is divisible by **3**.

   Our number is **12x**, and 12 is divisible by both 2 and 3.

   So, **12x is always divisible by 6**.

   3. Divisible by 7?

   12x is **not always** divisible by 7.

   For example:

   - If x = 1, number = 12 (not divisible by 7)
   - If x = 2, number = 24 (not divisible by 7)

   Not always divisible by 7.

   The number is **always divisible by 4 and by 6**.

   Hence, the correct answer is option d.

---

2. **Tom wants to make gift boxes combining chocolates and toys. He has 36 chocolates and 48 toys. If he wants to make all the boxes identical and have nothing left over, what is the maximum number of gift boxes he can make?**

   a) 12 b) 24 c) 10 d) 13

   Answer: a

   Solution:

   Tom wants to make the greatest possible number of identical gift boxes using all 36 chocolates and 48 toys, with nothing left over. To do this, he must divide both the chocolates and the toys into the same number of equal groups. So, we think: what is the largest number of groups that both 36 and 48 can be split into evenly?

   If he tries to make many small groups, the number of groups must divide both totals exactly. The largest number that divides 36 and 48 without leaving any remainder is **12**.

This means he can make **12 identical boxes**. Each box will contain **36 ÷ 12 = 3 chocolates** and **48 ÷ 12 = 4 toys**, with nothing left over. Hence, the correct answer is option a.

---

3. Sam has 22 pencils and Mary has 14 pencils. They both need to individually divide their pencils among 4 students such that neither Sam nor Mary has any pencil left. Also, all the 4 students should receive an equal number of pencils. What is the least number of pencils that Sam must give to Mary to fulfil the condition?

a) 1 pencil b) 2 pencils c) 4 pencils d) 6 pencils

Answer: b

Solution:

Sam has 22 pencils and Mary has 14 pencils and they need to divide all their pencils such that each of the 4 students should get an equal number of pencils. For each of them to individually be able to distribute their pencils among 4 kids, the number of pencils with each should be a multiple of 4.

Therefore, Sam can give 2 pencils to Mary. The new count of pencils will be:

Sam = 20 pencils and Mary = 16 pencils.

Now, they can divide the pencils among 4 students such that all 4 of them get an equal number of pencils.

Hence, the correct answer is option b.

---

4. Alex has four boxes - A, B, C, and D.

- **A can accommodate all numbers which are multiples of 5**
- **B can accommodate all numbers which are multiples of 3**
- **C can accommodate all numbers which are even**
- **D can accommodate all numbers which are multiples of 4**

Alex has to fit the following numbers in the boxes above. What is the MINIMUM number of boxes he needs?

3, 15, 24, 36, 45, 60

a) 1 b) 2 c) 3 d) 4

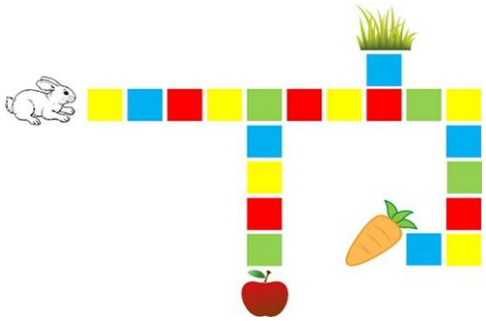
Answer: a

Solution:

Since all the numbers are multiples of 3, the minimum number of boxes required is 1, as all the boxes can fit into a single box. Hence, the correct answer is option a.

---

5. If the rabbit always jumps to every third tile from its position and it takes 2 minutes for each jump, how long will it take the rabbit to reach the carrot?

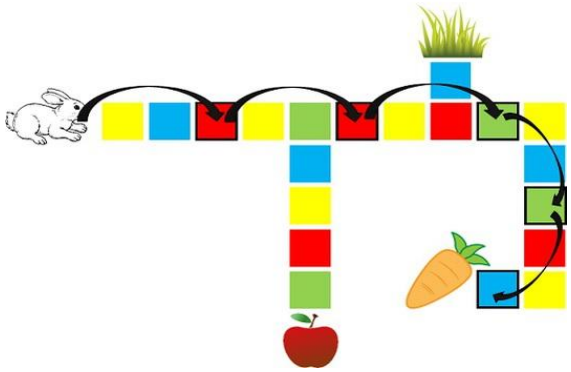


a) 10 minutes b) 8 minutes c) 6 minutes d) 5 minutes

Answer: a

Solution:

The rabbit needs 5 jumps to reach the carrot. Each jump takes 2 minutes, so the total time is 5 × 2 = 10 minutes. Hence, the correct answer is option a.



ALTERNATE METHOD:
There are 15 blocks on the way to the carrot. The rabbit jumps on every 3rd block.
So, it lands on 15/3 = 5 blocks only.
As 5 x 2 minutes = 10 minutes, the rabbit takes 10 minutes to reach the carrot.

---

6. All the number pairs given in the options have a characteristic common to them, except one pair which is different. Find the number pair that is the odd one out.

a) 13, 25 b) 12, 42 c) 10, 15 d) 45, 72

Answer: a

Solution:

The number pair in option a is the only pair out of all the four where the first and second numbers have no common factor.
Option b: 12 and 42 (both numbers are divisible by 2, 3, 6)
Option c: 10 and 15 (both numbers are divisible by 5)
Option d: 45 and 72 (both numbers are divisible by 3 and 9)
Hence, the correct answer is option a.

---

7. Seema has two yarns measuring 56 cm and 98 cm which she plans to cut into pieces of equal length with nothing left over.
What is the greatest possible length of each piece?

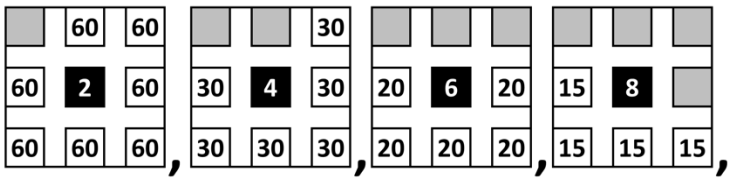
a) 7 cm b) 14 cm c) 21 cm d) 28 cm

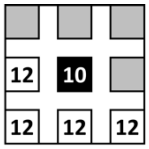
Answer: b

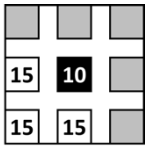
Solution:

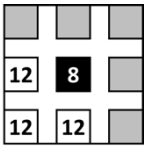
To solve this question, we first make a list of all possible factors for the given length of the yarn and find the Highest Common Factor for the two numbers.
FACTORS of 56 are 1, 2, 4, 7, 8, 14, 28, and 56.
FACTORS of 98 are 1, 2, 7, 14, 49, and 98.
Clearly, 14 is the H.C.F.
Hence, the correct answer is option b.

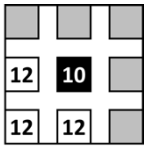
8. Find the next term in the following series:



a) 

b) 

c) 

d) 

Answer: d

Solution:

In each term, the number in the white block multiplied by the number in the black block equals 120, and the number of grey blocks increases by one in the clockwise direction, starting from the top left corner.

The number in the black block begins at 2 and increases by 2 in each term.

Since it is 8 in the fourth term, it will be 10 in the fifth term.

To maintain a product of 120 in the fifth term, the white block must be 120 ÷ 10 = 12.

Therefore, the fifth term has five grey blocks, 12 in the white block, and 10 in the black block. Hence, the correct answer is option d.

---

9. Which of the following statements is/are sufficient to answer the given question?

Question: Is any one of the integers A, B, or C divisible by 3?
Statement 1: A, B, and C are three consecutive natural numbers.
Statement 2: Value of B is 32.

a) Only 1 is sufficient
b) Only 2 is sufficient
c) Both 1 and 2 are necessarily required
d) None of these

Answer: a

Solution:

Statement 1:

A, B, and C are three consecutive natural numbers.

In any set of **three consecutive natural numbers**, one number is **always** divisible by 3.

Examples:

- 4, 5, 6: 6 is divisible by 3
- 10, 11, 12: 12 is divisible by 3
- 31, 32, 33: 33 is divisible by 3

This pattern is always true because every third number is a multiple of 3.

So, **Statement 1 alone is sufficient** to answer the question.

Statement 2: Value of B is 32.

This does **not** tell us whether **A, B, and C** are consecutive numbers or how they are related. Without knowing the relationship among A, B, and C, we **cannot** say if any of them must be divisible by 3.

So, **Statement 2 alone is NOT sufficient**.

Do we need both statements together?

No, Statement 1 already gives the complete information needed.

Conclusion: **Only Statement 1 is sufficient.**

Hence, the correct answer is option a.

10. What is the value of X?

Information 1: The sum of factors of X is 42

Information 2: X has exactly two factors

To answer the given question, which of the given information is/are sufficient?

a) Only 1

b) Only 2

c) Both 1 and 2 are required

d) Question cannot be answered even if both pieces of information are used

Answer: c

Solution:

We need to determine the value of X.

Information 1: The sum of factors of X is 42

Many numbers can have their factors adding up to 42. Therefore, we cannot determine the exact value of X using this information alone.

So, Information 1 alone is not sufficient.

Information 2: X has exactly two factors

A number with exactly two factors is a prime number. However, there are many prime numbers, so we still cannot determine the exact value of X.

So, Information 2 alone is not sufficient.

Using both Information 1 and Information 2 together:

From Information 2, X is a prime number, so its factors are 1 and X.

From Information 1, the sum of factors is 42.

So,

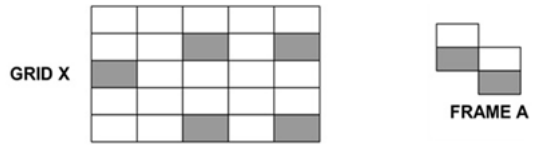
1 + X = 42

Therefore, X = 41

Hence, the question can be answered using both pieces of information.

Thus, the correct answer is option c.

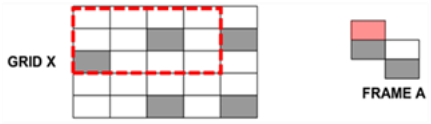
At how many DIFFERENT POSITIONS can we place FRAME A in GRID X such that none of the grey blocks of the FRAME overlap any grey block of the GRID? The entire FRAME A should lie on the GRID.
Note: *You cannot rotate the FRAME*



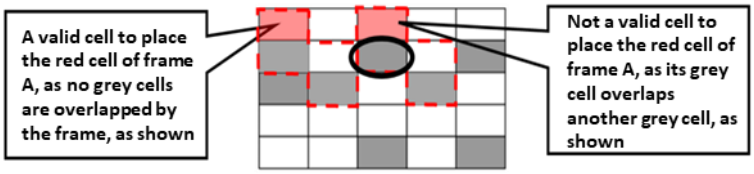
(a) 8 (b) 6 (c) 10 (d) 11

Answer: A
Solution:

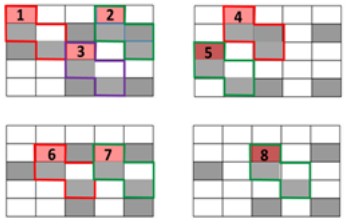
The GRID seems to be large, but we do not need to check each and every cell and see if we can place FRAME A. As it is mentioned that the whole FRAME must lie within the GRID, our first step is to **logically determine** the limits until where the FRAME can be placed. As shown below, the box which is highlighted in red in the FRAME, can stay only within the highlighted red rectangle of the GRID. Else, some part of the FRAME definitely lies out of the GRID, which is contradictory to our condition. So, logically, it is enough if we just visualize placing the red cell of the FRAME anywhere in this rectangle and we need not consider the cells beyond that.



A sample valid and invalid positioning of FRAME A is shown below:

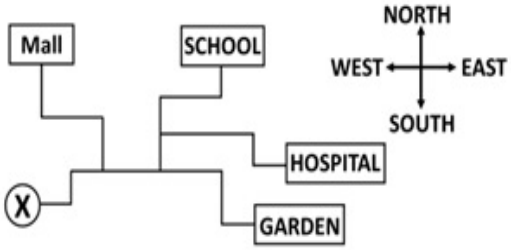


Likewise, 8 such valid spots can be found altogether, as shown below, where the top red cell of the FRAME can be placed, such that the whole FRAME lies within the GRID and no grey cell of the FRAME overlaps that of the GRID. Hence, the correct answer is option a.



Chapter 14: Maps and Locations

1. **Aman can only travel EAST and NORTH from point X, following the route shown on the map. Which of the following locations can Aman reach?**



a) Garden b) School c) Hospital d) Both b and c

Answer: b

Solution:

Aman can only travel east and north from point X.

• Hospital: Although Aman can travel east and north toward the hospital, the path eventually turns south (refer to Image 1). Since Aman cannot walk south, this option is eliminated.

• School: Aman can reach the school because the path only includes east and north turns (refer to Image 2).

• Garden: Although Aman can travel east and north toward the garden, the path eventually turns south (refer to Image 3). Since Aman cannot walk south, this option is also eliminated.

Hence, the answer is option b.

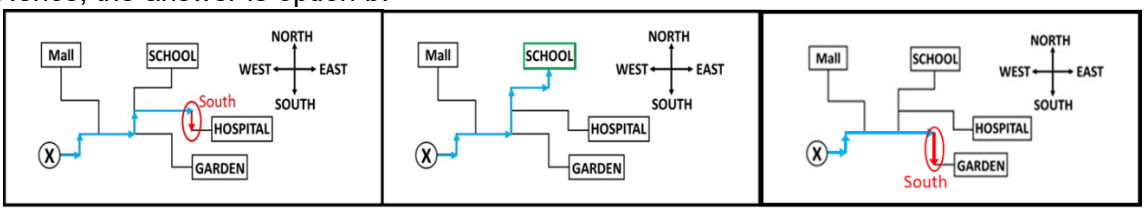


Image 1 Image 2 Image 3

---

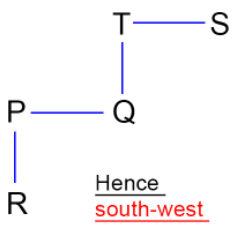
2. **There are 5 villages, P, Q, R, S, and T, situated close to each other. P is to the west of Q, R is to the south of P, T is to the north of Q, and S is to the east of T. In which direction is R with respect to S?**

a) North-West b) South-East c) South-West d) North-East

Answer: c

Solution:

Proceeding in a systematic way and plotting each of P, Q, R, S, and T, we get the relative directions as shown in the image. So, R is in the South-West of S. Hence, the correct answer is option c.



3. **Due to an accident, a direction pole at a road crossing turns in such a manner that now the east pointer is showing south-west. A traveller went in the wrong direction thinking that he was travelling south. In what direction did he actually end up going?**

a) South-West b) North-West c) North-East d) South-East

Answer: b

Solution:

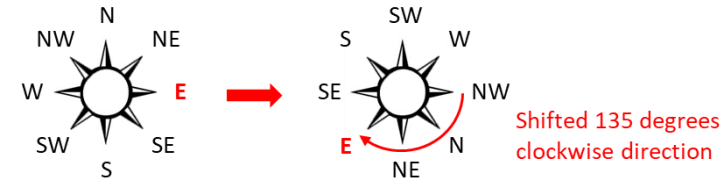
The question states that after the accident, the **east pointer of the direction pole is showing south-west**. In an **8-direction compass**, each direction is separated by **45 degrees**. Therefore, from its original position, the direction pole has **rotated 135 degrees clockwise**.

As shown in the image below, this rotation shifts all the directions on the pole **135 degrees clockwise from their actual positions**.

The traveller followed the pole thinking he was going **south**. However, because the pole is rotated, the direction shown as **south on the pole actually corresponds to north-west in the real directions**.

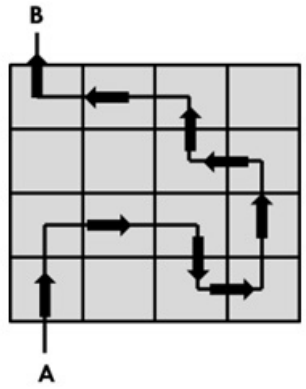
Therefore, the traveller actually travelled in the **north-west direction**.

Hence, the correct answer is option b.



---

4. **A person travels from point A to B along the path shown. How many times did the person take a right turn?**

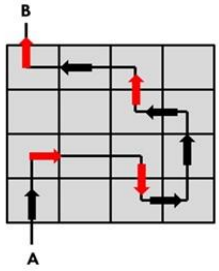


a) 4 b) 5 c) 6 d) 7

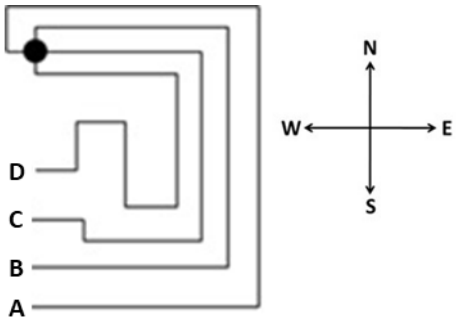
Answer: a

Solution:

As highlighted in the image, a person takes 4 right turns. Hence, the correct answer is option a.



5. **Given below are jogging tracks with four different gates A, B, C, and D.**
- A person who enters from Gate A must exit through Gate C and vice versa
- A person who enters from Gate B must exit through Gate D and vice versa
Which gate should a person choose to enter if he wants the sun to be on his left when he reaches the black circle for the first time in the morning?



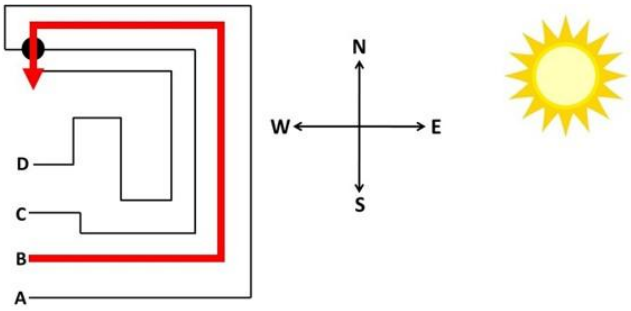
a) A b) B c) C d) D

Answer: b

Solution:

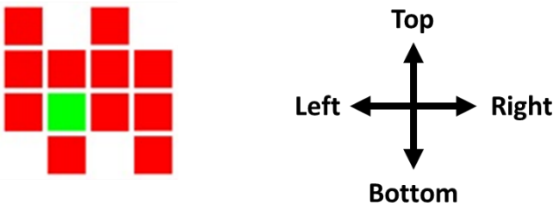
The sun is in the East in the morning.

Now, for the sun to be on his left when he reaches the black circle in the morning, the person should be moving from North to South, as shown below. So, he should take entry point B and follow the path highlighted in RED. Hence, the correct answer is option b.



---

6. **If a person can only move upwards (towards the top) or to the right, how many red blocks can he never reach if he starts from the green block?**



a) 3 b) 4 c) 5 d) 6

Answer: c

Solution:

As shown in the image, a person cannot cover the 5 blocks marked in yellow. Hence, the correct answer is option c.

---

7. Sam and Bob are facing North. After this, they take the following turns:
1. Sam takes 1 left turn, then 2 right turns, and finally 1 left turn
2. Bob takes 2 left turns followed by 3 right turns
Which of the following directions are they facing currently?
Note: *A Right or a Left turn refers to a 90-degree turn*

a) Sam faces North and Bob faces East
b) Sam faces North and Bob faces South
c) Sam faces North and Bob faces West
d) Sam faces East and Bob faces North

Answer: a

Solution:

We know that 1 right turn cancels out 1 left turn.
Sam: 2 right turns and 2 left turns = 0 turns.
So, effectively, Sam didn't take any turns. Hence, he faces the same direction i.e. North
Bob = 3 right turns and 2 left turns = 1 right turn.
Thus, Bob will be facing EAST.
Therefore, Sam faces North and Bob faces East. Hence, the correct answer is option a.

---

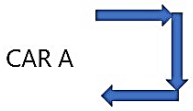
8. Three cars A, B, and C started moving towards the East. After travelling for a while, cars A and B took a right turn. After travelling further, car C took a left turn and car A took another right turn. In which directions are cars A, B, and C travelling now?

a) A = East, B = West, C = North
b) A = West, B = North, C = South
c) A = West, B = South, C = North
d) A = East, B = West, C = South

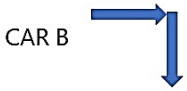
Answer: c

Solution:

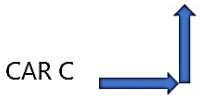
Car A travels east and turns right twice. Hence, Car A is facing west.



Car B travels east and turns right. Hence, Car B is facing south.



Car C travels east and turns left. Hence, Car C is facing north.



Hence, option c is the correct answer.

9. Two airplanes A and B are moving north. After flying for 50 metres:
1. Airplane A turns right and travels for 25 metres, then turns left and travels for another 25 metres
2. Airplane B turns left and travels for 50 metres, then turns right and travels for 25 metres
What is the distance between the airplanes now if the initial distance between them is 10 metres and A is on the right side?

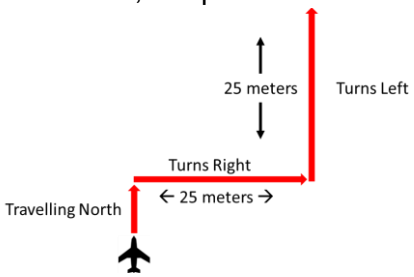
a) 25 meters b) 85 meters c) 50 meters d) 100 meters

Answer: b

Solution:

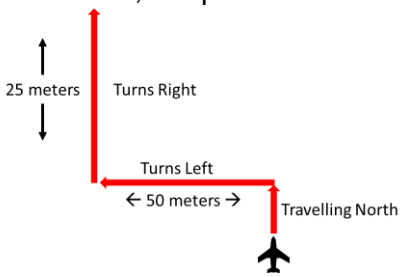
Let us trace the path of plane A:

A is travelling north and takes a right and travels 25 metres. Then A takes a left turn and travels for 25 metres. So, the path of A is as shown below:

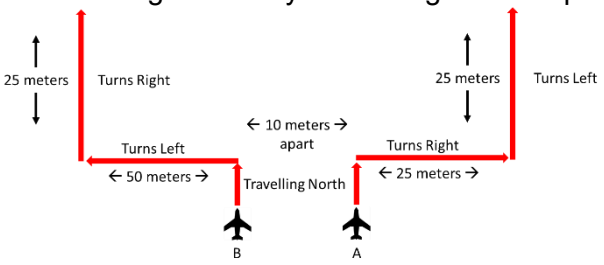


Now let us trace the path of plane B:

B is travelling north and takes a left and travels 50 metres. Then B takes a right turn and travels for 25 metres. So, the path of B is as shown below:



A is to the right of B. By combining both the paths, we get the following path:



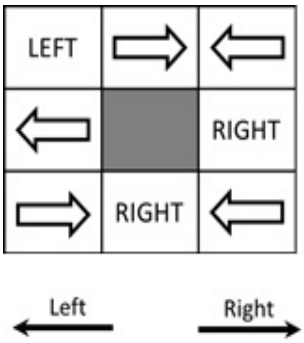
So, the distance between A and B after they take different paths is:

50 meters + 10 metres + 25 metres = 85 meters.

Hence, the correct answer is option b.

10. How many arrows in the image below are pointing in the OPPOSITE DIRECTION compared to the direction written in the boxes they are adjacent to?

Note: *For two boxes to be adjacent they MUST share one common side. Boxes having only a common corner are not adjacent*

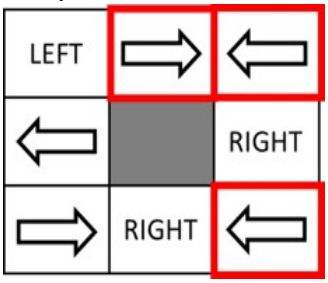


a) 2 b) 3 c) 4 d) 5

Answer: b

Solution:

As highlighted in the image given below, there are 3 arrows which are pointing in the opposite direction compared to the direction written in the boxes they are adjacent to.



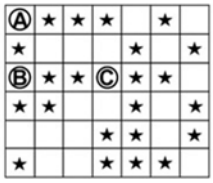
Hence, option b is the correct choice.

Three friends - A, B, and C - are standing in a grid as shown below. Each of them moves 5 steps in the grid by following the exact sequence of arrows given below, such that:

• For a WHITE arrow, they move in the OPPOSITE direction of the arrow

• For a BLACK arrow, they move in the SAME direction as the arrow

If they score 1 point for stepping on a block with a star then which friend will score the HIGHEST points?



(a) A
(b) B
(c) C
(d) All will get an equal number of points

Answer: b

Solution:

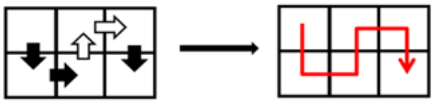
It is mentioned that for a white arrow, they move in the opposite direction of that arrow, while for a black arrow, they move in the same direction as the arrow.

So, the path mentioned in the question is not the EXACT path to be followed by A, B and C. As they have to travel in the opposite direction of the white arrows, the intended path would be as shown below:

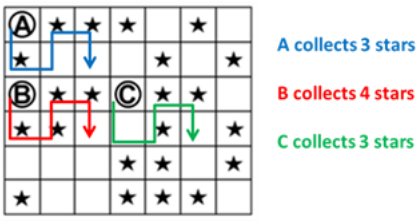
Question Path

Intended Path

As the intended path is to be followed, the path taken by A, B, and C across the grid would be as shown below:



When A, B and C follow the intended path, the number of stars collected by each of them would be:



Hence, option b is the correct choice.

Chapter 15: Data Through Pictures

1. **Each flower has a value shown in Image 1. These flowers are placed in Image 2. The numbers written at the end of each row represent the sum of the values of the flowers in that row. Which flowers from the options below can come in place of A and D?**

IMAGE 1

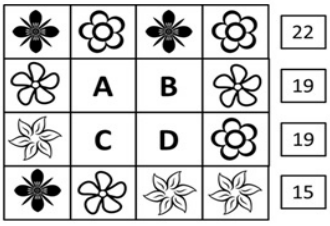


IMAGE 2

a) 

b) 

c) 

d) 

Answer: d

Solution:

For the 2nd row in image 2:

A + B + 8 = 19

A + B = 11

Only the first 2 flowers can add up to 11. So, A = 6 or 5 and B = 6 or 5

For the 3rd row in image 2:

C + D + 9 = 19

C + D = 10

Possible flower values that give 10:

1) 1st and 3rd flowers can add up to 10. So, C = 6 or 4 and D = 6 or 4

Or

2) 2nd and 2nd flowers can add up to 10. So, C = 5 and D = 5

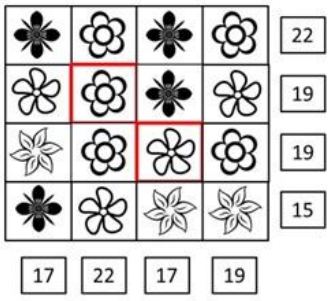
Option a is eliminated as A cannot be 4.

Option b is eliminated as D cannot be 3.

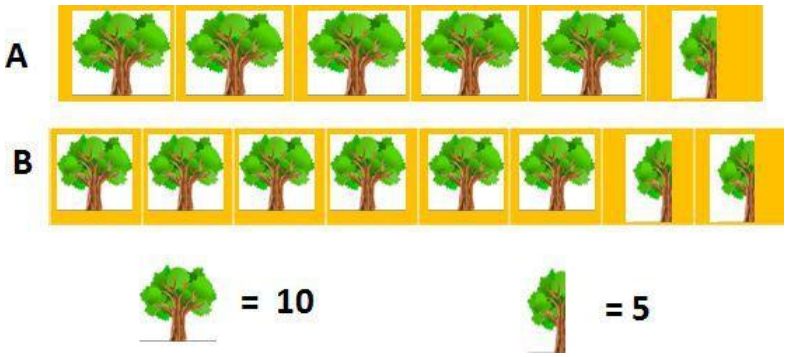
Option c is eliminated as A cannot be 4.

Option d is the correct answer as A can be 6 and D can be 4.

Hence, option d is the correct answer.



2. **The given image shows the number of trees with Teams A and B. One full tree picture represents 10 trees, and a half tree represents 5 trees. How many more trees does Team B have than Team A?**



a) 5 b) 10 c) 15 d) 20

Answer: c

Solution:

Team A has 5 full trees and 1 half tree.

So, total trees with Team A = (5 × 10) + 5 = 50 + 5 = 55

Team B has 6 full trees and 2 half trees.

So, total trees with Team B = (6 × 10) + (2 × 5) = 60 + 10 = 70

Now, difference = 70 − 55 = 15

Hence, Team B has 15 more trees than Team A. Therefore, the correct answer is option c.

---

3. **Company A packages different types of mobile parts/accessories on the following days:**
   - Charger on Mondays, Tuesday, and Thursdays
   - Batteries on all days except on Friday
   - Earphones only on Mondays and Wednesdays
   - Screen on all days except on Thursday
   - Headphones on all days except on Wednesday
   On which days would it be possible for at least three accessories/parts to be packaged on the same day?

a) Everyday b) All days except Thursday
c) All days except Friday d) Only on Mondays and Tuesdays

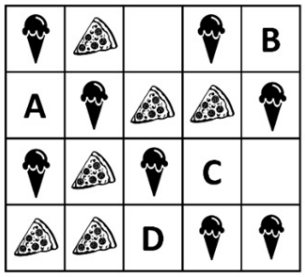
Answer: c

Solution:

As shown in the table below, on all days except Friday, it would be possible for at least three accessories/parts to be packaged on the same day. Hence, the correct answer is option c.

ITEMS	MON	TUE	WED	THU	FRI	SAT	SUN
Charger	✓	✓	X	✓	X	X	X
Batteries	✓	✓	✓	✓	X	✓	✓
Earphones	✓	X	✓	X	X	X	X
Screen	✓	✓	✓	X	✓	✓	✓
Headphones	✓	✓	X	✓	✓	✓	✓

4. **Sam is standing on a block where there are 6 items in total in its row and column combined, with more ice creams than pizza. Out of A, B, C, and D, which block is Sam standing on?**



a) A b) B c) C d) D

Answer: c

Solution:

To solve such questions, one must check each of the positions given in the options, one after the other.
Option a: Sam at block A.
The total number of items in the corresponding row and column would be 4 + 3 = 7.
As there should be only 6 items altogether, option a is incorrect.
Option b: Sam at block B.
The total number of items in the corresponding row and column would be 3 + 2 = 5.
As there should be only 6 items altogether, option b is incorrect.
Option c: Sam at block C.
The total number of items in the corresponding row and column would be 3 + 3 = 6.
No. of ice creams = 4
No. of pizzas = 2
As there are more ice creams than pizzas and 6 items altogether, block C is the correct position of Sam.
Option d: Sam at block D.
The total number of items in the corresponding row and column would be 4 + 2 = 6.
No. of ice creams = 3
No. of pizzas = 3
There should be more ice creams than pizzas, but the numbers of ice creams and pizzas are equal.
Hence, the correct answer is option c.

---

5. **If at most 9 candies can be kept on each table, then how many more candies in total can be kept on table B and table C?**

a) 6 b) 7 c) 8 d) 9

Answer: b

Solution:

3 more candies can be kept on table B and 4 more candies can be kept on table C. Therefore, 7 more candies can be placed on tables B and C in total. Hence, the correct answer is option b.

6. **Shown below are six towers of different heights. Which two towers have the same number of shorter towers placed to their left?**
Note: *Please consider ALL towers to the left while counting the number of shorter towers*

a) B - C b) B - D c) C - F d) D - F

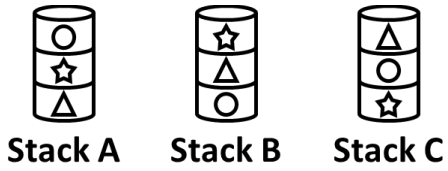
Answer: d

Solution:

Tower A is the leftmost tower, hence it has no other towers towards its left.
Tower B has 1 (tower A) shorter tower placed to its left.
Tower C has both towers placed to its left taller than itself.
Tower D has 3 (tower A, tower B, tower C) shorter towers placed to its left.
Tower E has all the towers placed to its left taller than itself.
Tower F has 3 (tower A, tower C, tower E) shorter towers placed to its left.
Hence, tower D and tower F have the same number of shorter towers placed to their left.
Therefore, the correct answer is option d.

---

7. **All three stacks shown below are placed one on top of another so that exactly one shape separates each pair of neighbouring stars. After arranging the stacks, which shape is fourth from the top?**
Note: *You cannot rearrange the shapes of each stack*



a) 

b) 

c) 

d) Cannot be determined

Answer: a

Solution:

Each stack has **one star**, and the stacks must be arranged so that **exactly one shape separates every pair of neighbouring stars**. The order of shapes **within each stack cannot be changed**.
Let us check the possible arrangements.
1. Suppose Stack A is placed at the top.
To maintain exactly **one shape between two stars**, the next stack must be **Stack B**.
However, if Stack B is placed in the middle, the remaining **Stack C** must be placed at the bottom. In this arrangement, the stars in **Stack B and Stack C** will have **two shapes between them**, which violates the condition.
So, **Stack A cannot be placed at the top**.
2. Suppose Stack B is placed at the top.
If Stack B is at the top, its star will be followed by two shapes within the same stack before the next stack begins. This means the next star will be separated by **two shapes instead of one**, which does not satisfy

the condition.

So, **Stack B cannot be placed at the top**.

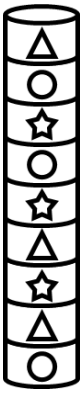
3. Suppose Stack C is placed at the top.

If we place **Stack B** below it, the two stars will become **adjacent**, which also breaks the condition.

Therefore, **Stack A must be placed below Stack C**, and the remaining **Stack B** will be placed at the bottom. This arrangement satisfies the condition that **exactly one shape separates every pair of neighbouring stars**.

The final arrangement (from top to bottom) becomes:

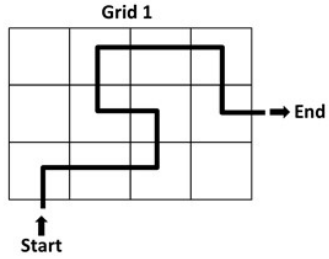
Stack C – Stack A – Stack B, as shown below.

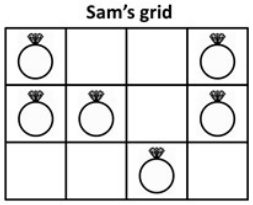


In this arrangement, the circle is fourth from the top. Hence, the correct answer is option a.

---

8. Sam must travel across the grid following the path shown in Grid 1.
Each block along his path must have a ring.
Some blocks already have rings placed on them.
How many MORE rings does Sam need to place along his path? Note: *Rings in Sam's grid cannot be moved*



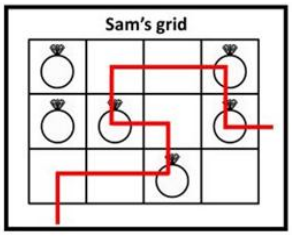


a) 6 b) 5 c) 4 d) 3

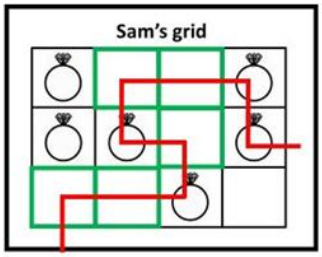
Answer: b

Solution:

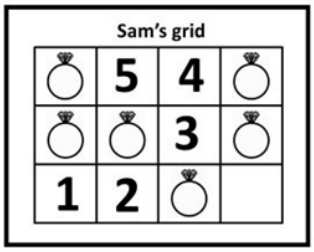
Sam needs to follow the path shown in **Grid 1**. Let's begin by tracing the path.



Let's highlight the blocks in his path that do not contain a ring.



Let's count the number of these highlighted blocks.



As highlighted above, Sam needs to place 5 more rings. Hence, the correct answer is option b.

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9. From the towers shown below, Tom, Paul, John, and Sam each own one tower:
- **Tom owns a tower which is positioned between A and C**
- **Paul owns a tower which is positioned between B and D**
- **John owns a tower which is positioned between F and H**
- **Sam owns a tower which is positioned between E and G**

Which friend's tower is the tallest among them?

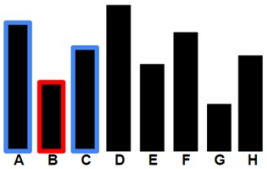
a) Sam b) Tom c) Paul d) John

Answer: a

Solution:

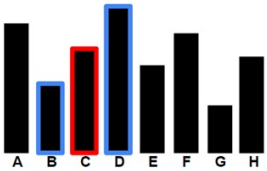
Tom owns a tower between A and C

Hence, Tom owns tower B (as highlighted in red colour)



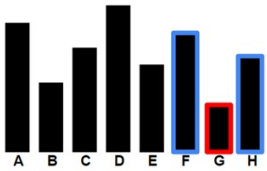
Paul owns a tower between B and D

Hence, Paul owns tower C (as highlighted in red colour)



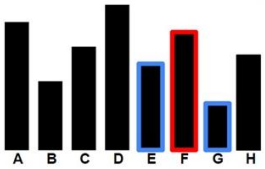
John owns a tower between F and H

Hence, John owns tower G (as highlighted in red colour)



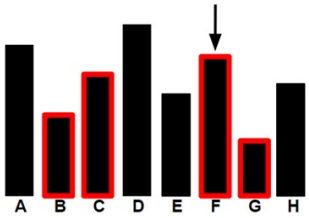
Sam owns a tower between E and G

Hence, Sam owns tower F (as highlighted in red colour)



Among the towers owned by these four friends, (B, C, G, F), the tallest tower is F. Hence, Sam owns the tallest tower.

Thus, the correct answer is option a.



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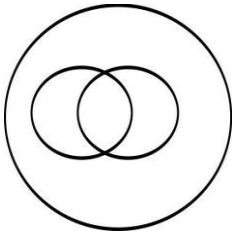
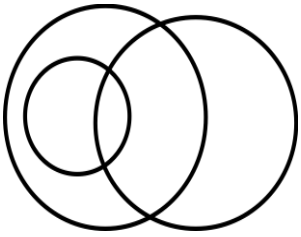
10. Which of the following Venn diagrams depicts the relationship between females, mothers, and doctors?

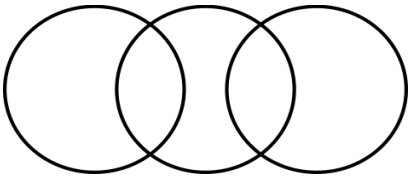
a)



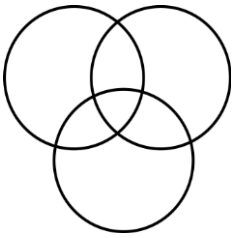
b)



c)



d)



Answer: b

Solution:

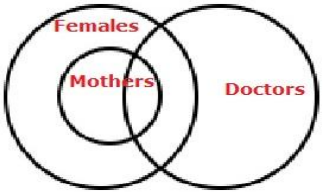
All mothers are females, so the circle representing mothers must lie entirely within the circle representing females. This condition is satisfied only in options a and b; therefore, options c and d are eliminated.

A doctor can be a female or a mother, but not all doctors are females or mothers, as some doctors can be men. Hence, option a is incorrect.

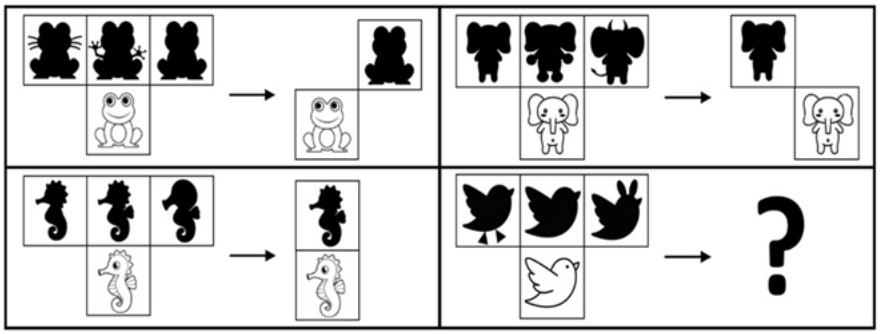
Therefore, the correct answer is option b, where the mothers' circle lies within the females' circle, and the doctors' circle intersects both without being a subset of either.

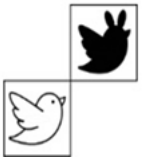
The diagram below shows correct depiction of the Venn diagram of females, mothers, and doctors.

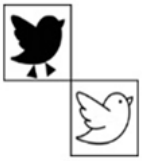
Hence, the correct answer is option b.



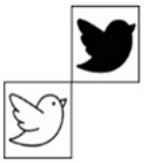
If each of the following terms follows the same theme, what will come in place of "?"



(a) 

(b) 

(c) 

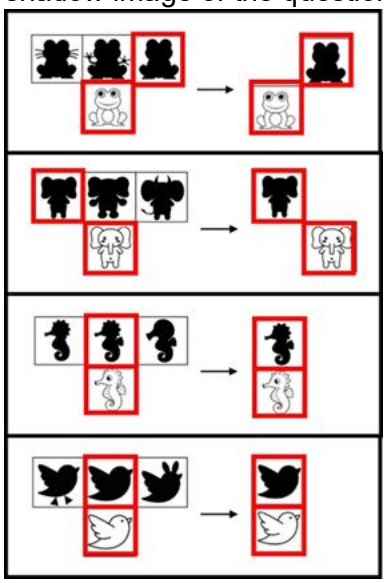
(d) 

Answer: c

Solution:

Before the arrow, each image has three shadows positioned above it. The task is to determine which of the three shadows is the correct shadow image of the image placed at the bottom.

After the arrow, both the correct shadow and the image at the bottom appear in the same positions as shown on the left. Hence, the answer is option c, as it represents the exact shadow image of the question image.



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